

## 3.12 Air Quality

This section reports the results of the *Air Quality Impact Technical Report* (Terry A. Hayes Associates 2005) prepared for the project.

### 3.12.1 Regulatory Setting

Air quality in the United States is governed by the federal Clean Air Act (CAA). In addition to being subject to the requirements of CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act (CCAA). At the federal level, the CAA is administered by the United States Environmental Protection Agency (USEPA). In California, the CCAA is administered by the California Air Resources Board (CARB) at the state level and by the Air Quality Management Districts at the regional and local levels. The proposed project is located within the Bay Area Air Quality Management District (BAAQMD).

USEPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS), which are required under the 1977 CAA and subsequent amendments. USEPA regulates emission sources that are under the exclusive authority of the federal government and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for meeting the state requirements of the federal CAA, administering the CCAA, and establishing the California Ambient Air Quality Standards (CAAQS). The CCAA requires all air districts in the state to endeavor to achieve and maintain the CAAQS, which are generally more stringent than the corresponding federal standards.

The BAAQMD is primarily responsible for assuring that the national and state ambient air quality standards are attained in the San Francisco Bay Area. The BAAQMD has jurisdiction over an approximately 5,600-square-mile area, commonly referred to as the Bay Area Air Basin (BAAB). The District's boundary encompasses most of the nine Bay Area counties: Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County and southern Sonoma County. The discussion of project air quality setting and effects refers primarily to conditions within the BAAB, which from both the federal and state regulatory perspectives is considered one geographic entity.

#### 3.12.1.1 NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

State and federal standards for major air pollutants are summarized in Table 3.12-1. Primary standards were established to protect the public health. Secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials,

vegetation and other aspects of the general welfare. Since the CAAQS are more stringent than the NAAQS, the CAAQS are used as the standard in the air quality analysis for the Highway 101 HOV Lane Widening Project.

**Table 3.12-1: State and National Ambient Air Quality Standards**

Pollutant	Averaging Period	California		Federal	
		Standards	Attainment Status	Standards	Attainment Status
Ozone (O <sub>3</sub> )	1 hour	0.09 ppm (180 µg/m <sup>3</sup> )	Non-attainment	0.12 ppm (235 µg/m <sup>3</sup> )	Non-attainment
	8 hour	--	--	0.08 ppm (157 µg/m <sup>3</sup> )	Non-attainment
Respirable Particulate Matter (PM <sub>10</sub> )	24 hour	50 µg/m <sup>3</sup>	Non-attainment	150 µg/m <sup>3</sup>	Attainment
	Annual Arithmetic Mean	20 µg/m <sup>3</sup>	Non-attainment	50 µg/m <sup>3</sup>	Attainment
Fine Particulate Matter (PM <sub>2.5</sub> ) <sup>1</sup>	24 hour	--	--	65 µg/m <sup>3</sup>	Attainment
	Annual Arithmetic Mean	12 µg/m <sup>3</sup>	Non-attainment	15 µg/m <sup>3</sup>	Attainment
Carbon Monoxide (CO)	8 hour	9.0 ppm (10 mg/m <sup>3</sup> )	Attainment	9.0 ppm (10 mg/m <sup>3</sup> )	Maintenance
	1 hour	20 ppm (23 mg/m <sup>3</sup> )	Attainment	35 ppm (40 mg/m <sup>3</sup> )	Maintenance
Nitrogen Dioxide (NO <sub>2</sub> )	Annual Arithmetic Mean	--	--	0.053 ppm (100 µg/m <sup>3</sup> )	Attainment
	1 hour	0.25 ppm (470 µg/m <sup>3</sup> )	Attainment	--	--
Sulfur Dioxide (SO <sub>2</sub> )	Annual Arithmetic Mean	--	--	0.03 ppm (80 µg/m <sup>3</sup> )	Attainment
	24 hour	0.04 ppm (105 µg/m <sup>3</sup> )	Attainment	0.14 ppm (365 µg/m <sup>3</sup> )	Attainment
	1 hour	0.25 ppm (655 µg/m <sup>3</sup> )	Attainment	--	--

<sup>1</sup> The Federal air quality standard for PM<sub>2.5</sub> was adopted in 1997. Presently, no methodologies for determining impacts relating to PM<sub>2.5</sub> have been developed or adopted by federal, state, or regional agencies. Additionally, no strategies or mitigation programs for PM<sub>2.5</sub> have been developed or adopted by Federal, State, or regional agencies.  
Source: California Air Resources Board and United States Environmental Protection Agency, January 2003.

## Attainment Status

Under CAA and CCAA requirements, areas are designated as either attainment or non-attainment for each criterion pollutant based on whether the NAAQS or CAAQS have been achieved. Areas are designated as non-attainment for a pollutant if air quality data show that a state or federal standard for the pollutant was violated at least once during the previous three calendar years. Exceedences that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as non-attainment. Under the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O<sub>3</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>. Under the CAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O<sub>3</sub>.

## Carbon Monoxide (CO)

Carbon monoxide (CO), a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhausts

release most of the CO in urban areas. CO dissipates relatively quickly, so ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. The BAAB is in attainment for CO at both the federal and state levels.

### **Ozone (O<sub>3</sub>)**

Ozone (O<sub>3</sub>), a colorless toxic gas, is the chief component of urban smog. O<sub>3</sub> enters the blood stream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O<sub>3</sub> also damages vegetation by inhibiting growth. O<sub>3</sub> forms in the atmosphere through a chemical reaction between reactive organic gases (ROG) and nitrogen oxides (NO<sub>x</sub>) under sunlight. Motor vehicles are the major sources of ROG and NO<sub>x</sub>. O<sub>3</sub> is present in relatively high concentrations within the Bay Area air basin. Under the CAA and the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O<sub>3</sub>.

### **Nitrogen Dioxide (NO<sub>2</sub>)**

Nitrogen dioxide (NO<sub>2</sub>), a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like O<sub>3</sub>, NO<sub>2</sub> is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO<sub>2</sub> are collectively referred to as NO<sub>x</sub> and are major contributors to ozone formation. NO<sub>2</sub> also contributes to the formation of PM<sub>10</sub> (see discussion of PM<sub>10</sub> below). The BAAB is in attainment for NO<sub>2</sub>.

### **Sulfur Dioxide (SO<sub>2</sub>)**

Sulfur dioxide (SO<sub>2</sub>) is a product of high-sulfur fuel combustion. The main sources of SO<sub>2</sub> are coal and oil used in power stations, in industries, and for domestic heating. Industrial chemical manufacturing is another source of SO<sub>2</sub>. SO<sub>2</sub> is an irritant gas that attacks the throat and lungs. SO<sub>2</sub> concentrations have been reduced to levels well below the state and national standards, but further reductions in emissions are needed to attain compliance with standards for sulfates and PM<sub>10</sub>, of which SO<sub>2</sub> is a contributor. The BAAB is in attainment for SO<sub>2</sub> at both the federal and state levels.

### **Suspended Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)**

Particulate matter consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Respirable particulate matter (PM<sub>10</sub>) refers to particulate matter less than 10 microns in diameter, about one-seventh the thickness of a human hair. Fine particulate matter (PM<sub>2.5</sub>) refers to particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. PM<sub>10</sub> and PM<sub>2.5</sub> pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. Major sources of PM<sub>10</sub> include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands; and atmospheric chemical and photochemical reactions. PM<sub>2.5</sub> results from fuel combustion (from motor vehicles, power generation, industrial facilities), residential fireplaces, and wood stoves. In addition, PM<sub>2.5</sub> can be

formed in the atmosphere from gases such as SO<sub>2</sub>, NO<sub>x</sub>, and volatile organic compounds. The Sonoma County portion of the BAAB is a non-attainment area for PM<sub>10</sub> and PM<sub>2.5</sub> under the CCAA.

## **Lead**

Prior to 1978, mobile emissions were the primary source of lead in air. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95 percent. Currently, industrial sources are the primary source of airborne lead. Since the proposed project does not contain an industrial component, lead emissions were not analyzed in the air quality assessment. The potential for aerially deposited lead to be in soils along Highway 101 is discussed in Section 3.11, Hazardous Waste/Materials.

### **3.12.1.2 AIR QUALITY PLANS**

The BAAQMD, in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), is responsible for preparing air quality plans pursuant to the CAA and CCAA. Under the CAA, State Implementation Plans (SIPs) are required for areas that are designated as non-attainment for O<sub>3</sub>, CO, NO<sub>x</sub>, SO<sub>x</sub>, or PM<sub>10</sub>. For the BAAB, a SIP is required for O<sub>3</sub> since the region is currently designated as a Federal Non-attainment Area for O<sub>3</sub>. The most current SIP is called the Bay Area 2001 Ozone Attainment Plan, which was adopted by the MTC, ABAG, and BAAQMD in October 2001. CARB adopted this Plan in November 2001, and EPA approved the associated emissions budget in February 2002.

Whereas the SIP is prepared pursuant to the CAA, the Bay Area Clean Air Plan (CAP) is prepared to meet the requirements of the CCAA. The CAP is the region's plan for reducing ground-level ozone. The CAP identifies how the BAAB would meet the state O<sub>3</sub> standard by its attainment date. The 2000 CAP focuses on identifying and implementing control measures that would reduce O<sub>3</sub>. It was adopted by the BAAQMD in December 2000.

### **3.12.1.3 AIR QUALITY CONFORMITY**

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to CAA requirements. Transportation conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. A conformity determination demonstrates that total emissions projected for a plan or program are within the emissions limits ("budgets") established by the air quality plan or SIP and that transportation control measures (TCMs) are implemented in a timely fashion. Conformity applies to transportation plans, transportation improvement programs (TIPs), and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in non-attainment or maintenance areas. Section 176 of the CAA specifies that no federal agency may approve, support, or fund an activity that does not conform to the applicable implementation plan. FHWA and FTA jointly make conformity determinations within air quality non-attainment and maintenance areas to ensure that federal actions conform to the "purpose" of SIPs. In late 1993, USEPA promulgated final

rules for determining conformity of transportation plans, programs, and projects. These final rules, contained in 40 CFR Part 93, govern the conformity assessment for the proposed project.

### **3.12.2 Affected Environment**

#### **3.12.2.1 CLIMATE**

The Bay Area is characterized by cool, dry summers and mild, wet winters. Temperature in the project area and its vicinity averages approximately 59 degrees Fahrenheit annually, with an average maximum summer temperature of approximately 88 degrees Fahrenheit and an average minimum winter temperature of approximately 38 degrees Fahrenheit. The Eastern Pacific High, which is a strong persistent anticyclone, is the major influence on the climate in the area. The area experiences little precipitation during the summer months, when a high-pressure cell prevents storms from affecting the California coast. During the winter, the high-pressure cell weakens and shifts southward. Storms occur more frequently and winds are usually moderate. Total precipitation in the project area averages approximately 29.5 inches annually.

Low wind speeds and temperature inversions contribute to the buildup of air pollution. Low wind speed contributes to the buildup of air pollution because it allows more pollutants to accumulate in the air within a period of time. The highest air pollutant concentrations in the Bay Area generally occur during inversions, when temperature increases as altitude increases, thereby preventing air close to the ground from mixing with the air above it. As a result, air pollutants are trapped near the ground.

#### **3.12.2.2 AIR MONITORING DATA**

The BAAQMD monitors air quality conditions at various locations throughout the Bay Area Air Basin. The closest air-monitoring station to the project area is the Santa Rosa–5<sup>th</sup> Street monitoring station, which is approximately 6.4 miles north of the project area. Historical data from the Santa Rosa–5<sup>th</sup> Street monitoring station were used to characterize existing conditions within the vicinity of the proposed project area and to establish a baseline for estimating future conditions with and without the proposed project.

Criteria pollutants monitored at the station include O<sub>3</sub>, CO, NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>. SO<sub>2</sub> is not monitored at this monitoring station or at any of the other monitoring stations in Sonoma County. A summary of the data recorded at the monitoring station during the 2001-2003 period is shown in Table 3.12-2, Criteria Pollutant Violations: Santa Rosa–5<sup>th</sup> Street Monitoring Station. The CAAQS and NAAQS for the criteria pollutants are also shown in the table. As Table 3.12-2 indicates, criteria pollutants CO and NO<sub>2</sub> did not exceed the CAAQS or NAAQS between the years 2001 and 2003. O<sub>3</sub> exceeded the state one-hour standard once during the 2001-2003 period. PM<sub>2.5</sub> exceeded the federal 24-hour standard once during the period, and PM<sub>10</sub> exceeded the state 24-hour standard on five days during the period.

**Table 3.12-2: 2001-2003 Criteria Pollutant Violations: Santa Rosa – 5<sup>th</sup> Street Monitoring Station**

Pollutant	Standard Exceedence	2001	2002	2003
Ozone (1 hour)	Maximum 1-hr concentration (ppm)	0.086	0.077	0.096
	Days > 0.12 ppm (Federal 1-hr standard)	0	0	0
	Days > 0.09 ppm (State 1-hr standard)	0	0	1
Ozone (8 hour)	Maximum 8-hr concentration (ppm)	0.063	0.060	0.079
	Days > 0.08 ppm (Federal 8-hr standard)	0	0	0
Carbon Monoxide	Maximum 8-hr concentration (ppm)	2.40	2.10	1.77
	Days > 9 ppm (Federal 8-hr. standard)	0	0	0
	Days > 9.0 ppm (State 8-hr standard)	0	0	0
Nitrogen Dioxide	Maximum 1-hr concentration (ppm)	0.057	0.054	0.055
	Days > 0.25 ppm (State 1-hr standard)	0	0	0
PM <sub>2.5</sub>	Maximum 24-hr concentration (µg/m <sup>3</sup> )	75.9	50.7	38.8
	Days > 65 µg/m <sup>3</sup> (Federal 24-hr standard)	1	0	0
PM <sub>10</sub>	Maximum 24-hr concentration (µg/m <sup>3</sup> )	78.1	63.6	36.3
	Estimated days > 150 µg/m <sup>3</sup> (Federal 24-hr standard)	0	0	0
	Estimated days > 50 µg/m <sup>3</sup> (State 24-hr standard)	3	2	0
Source: California Air Resources Board				

### 3.12.2.3 BACKGROUND CARBON MONOXIDE (CO) CONDITIONS

CO concentrations are typically used as an indicator of conformity because CO levels are directly related to vehicular traffic volumes, the main source of air pollutants. A review of data from the Santa Rosa–5<sup>th</sup> Street monitoring station for the 2001-2003 period indicates that the average eight-hour background CO concentration is approximately 2.3 ppm. Assuming a typical persistence factor of 0.6, the estimated one-hour background concentration is approximately 3.9 ppm. The existing eight-hour background concentration does not exceed the state and federal eight-hour CO standard of 9.0 ppm. Additionally, the existing one-hour background concentration does not exceed the state and federal one-hour CO standards of 20.0 ppm and 35.0 ppm, respectively.

### 3.12.2.4 SENSITIVE RECEPTORS

The following categories of people, as identified by the CARB, are considered most sensitive to air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. Locations that may contain a high concentration of these sensitive population groups are called sensitive receptors and include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. Four representative sensitive receptors have been identified within a quarter-mile of Highway 101 within the project limits:

- Training Wheels Preschool (65 West Cotati Avenue, Cotati)
- Cotati-Rohnert Park Co-Op Nursery (150 West Sierra Avenue, Cotati)
- Mt. Taylor Children's Center, (190 Arlen Drive, Rohnert Park)
- Quest Montessori Elementary School (21 William Street, Cotati)

In addition to the sensitive receptors listed above, residential uses are also located within a quarter-mile of the highway within the project limits.

### 3.12.3 Environmental Consequences

#### 3.12.3.1 METHODOLOGY

CARB's EMFAC2002 emissions factor model and Caltrans' CALINE4 dispersion model were used to determine air quality impacts. Caltrans' Transportation Project-Level Carbon Monoxide Protocol was used to determine CO impacts. A quantitative analysis was conducted for this project because the traffic report identified certain roadway segments within the project area would have future level-of-service (LOS) E or F under the Build Alternative. These roadway segments were analyzed to determine whether the project would result in any CO violations. Emissions and concentrations related to lead were not analyzed because the proposed project does not contain lead emissions sources. A qualitative PM<sub>10</sub> hot-spot analysis was conducted in accordance with 40 CFR 93.123 (b)(4), because the USEPA has not released modeling guidance on how to perform quantitative PM<sub>10</sub> hot-spot analysis.

*In addition to the criteria air pollutants for which there are NAAQS, USEPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Mobile Source Air Toxics (MSAT) are a subset of the 188 air toxics defined by the Clean Air Act (CAA). MSAT are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. Available tools do not enable prediction of project-specific health effects of the emission changes associated with the proposed project.*

*The six pollutants of interest for MSAT analysis are diesel particulate matter (DPM), acrolein, acetaldehyde, formaldehyde, benzene, and 1,3-butadiene.*

*FHWA issued MSAT assessment guidance in February 2006. According to the guidance, if a proposed project's AADT is greater than or equal to 140,000 vehicles, a quantitative analysis is required. Since the AADT for the Highway 101 project is less than this, a qualitative analysis was performed.*

The proposed project would have an adverse impact if:

- Daily operational emissions were to exceed the BAAQMD operational emissions thresholds for CO, ROG, NO<sub>x</sub>, or PM<sub>10</sub> as shown in Table 3.12-3.
- Operational emissions were to exceed federal emissions thresholds for ROG or NO<sub>x</sub>, as shown in Table 3.12-4.
- Project-related traffic were to cause CO concentrations at roadway segments to violate the CAAQS or NAAQS for either the one- or eight-hour period as shown in Table 3.12-1.
- *An increase in VMT would lead to an increase in MSAT emissions.*

**Table 3.12-3: BAAQMD Daily Operational Emissions Thresholds**

Criteria Pollutant	Pounds per Day
Carbon Monoxide (CO)	550
Reactive Organic Gas (ROG)	80
Nitrogen Oxides (NO <sub>x</sub> )	80
Particulates (PM <sub>10</sub> )	80
Source: Bay Area Air Quality Management District.	

**Table 3.12-4: Federal Emissions Threshold for Nonattainment Areas**

Pollutant	Pounds per Day <sup>1</sup>	Tons per Year
ROG	270	50
NO <sub>x</sub>	550	100
<sup>1</sup> Federal thresholds are expressed in tons per year. For ease of comparison, Federal thresholds have been converted to pounds per day.		
Source: United States Code of Federal Regulations, Title 40, Part 93.		

### 3.12.3.2 IMPACT ANALYSIS

#### No-Build Alternative

The No-Build Alternative assumes no major construction on Highway 101 through the project limits other than normal maintenance, rehabilitation and repair. The roadway improvements and maintenance are not anticipated to generate any new vehicle trips and, thus, would not affect the region's vehicle miles of travel (VMT). Since regional VMT is not anticipated to increase, changes in vehicle emissions are not anticipated. No substantial increase is expected in CO concentrations at sensitive receptor locations. PM<sub>10</sub> concentrations are not anticipated to increase. No impact is anticipated. *In addition, the amount of MSAT emitted would be proportional to the VMT assuming that other variables, such as fleet mix, are the same for both alternatives.*

#### Build Alternative (*Preferred Alternative*)

The proposed project would not generate any additional VMT, and thus, would not change vehicle emissions. Therefore, no substantial impacts associated with operational emissions are anticipated for the Build Alternative.

*The MSAT analysis compared emissions for the Build and No-Build Alternatives. The MSAT analysis concluded that the project-related increase in VMT would lead to higher MSAT emissions for the Build Alternative along the highway corridor, with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase also is offset somewhat by lower MSAT emission rates due to increased speeds and reductions in congestion.*

*The USEPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66 FR 17229 (March 29, 2001). In its rule, USEPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, its*



*national low emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel particulate matter emissions by 87 percent. Thus, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.*

To provide a worst-case simulation of CO concentrations within the area, CO concentrations were calculated for 26 roadway segments, including those segments predicted to have LOS E or F in 2030. At each roadway segment, traffic-related CO contributions were added to background CO conditions for the year 2010, which represents the opening year of the project and the year 2030, when traffic volumes in the project area are expected to stabilize. The reduction in roadway congestion and associated reduction in the time vehicles would spend idling or moving slowly would result in lower CO concentrations. The proposed project would not cause CO concentrations to exceed state or federal standards, and therefore, no substantial impact related to CO concentrations would occur under the Build Alternative.

Road dust is the primary source of operational PM<sub>10</sub> emissions for the proposed project. The project would not generate new vehicle trips. Additionally, the project is anticipated to improve the flow of vehicles and reduce congestion at nearby roadways. PM<sub>10</sub> concentrations are not anticipated to increase, and no impact is anticipated.

### **3.12.4 Avoidance, Minimization and/or Mitigation Measures**

No adverse impacts are anticipated, and therefore, no minimization or mitigation measures are recommended.

### **3.12.5 Transportation Conformity Analysis**

The FHWA cannot approve funding for project activities beyond preliminary engineering unless the project is in conformity with USEPA transportation conformity regulations (40 CFR Part 93). The criteria that the Build Alternative must satisfy are discussed below. The federal conformity criteria are applicable only to operations emissions. They do not apply to construction emissions.

§93.110 The conformity determination must be based on the latest planning assumptions.

ABAG and MTC are the Metropolitan Planning Organizations responsible for determining areawide population and employment forecasts, modeling regional travel demand, and formulating the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP). Assumptions used in the transportation and traffic analysis for this project, upon which the microscale

CO and regional criteria pollutant analyses are based, are derived from ABAG's most recently adopted population, employment, travel, and congestion estimates. Traffic forecasts for the proposed project were developed using the Sonoma County travel demand.

§93.111 The conformity determination must be based on the latest emission estimation model available.

Emission estimates are based on the CARB EMFAC 2002 model. Caltrans CALINE4 model was used for CO modeling. The EMFAC2002 and CALINE4 models are the most recent models approved by USEPA.

§93.112 The conformity determination must be made according to the consultation procedures of this rule and in the applicable implementation plan, and according to the public involvement procedures established in compliance with 23 CFR Part 450. The conformity determination must be made according to §93.105(a)(2) and (e) and the requirements of 23 CFR Part 450.

The proposed project would follow the consultation procedures in 20 CFR Part 450, 40 CFR Part 51, and 40 CFR Part 93 (§93.105(a)(2) and (e)) before making its conformity determination. The environmental document for the proposed project would be available for public review and comment prior to adoption.

§93.114 There must be a currently conforming transportation plan and TIP at the time of project approval.

The most recent RTP in the project area is the *Transportation 2030 Plan*. The most recent TIP is the 2005 TIP. The *Transportation 2030 Plan* was adopted by MTC in February 2005. The 2005 TIP was adopted by MTC on July 28, 2004. FHWA made its conformity determination for the *Transportation 2030 Plan* on March 17, 2005 and the 2005 TIP in October 4, 2004. The proposed project is included in the *Transportation 2030 Plan* and the 2005 TIP.

§93.115 The proposed project must come from a conforming transportation plan and TIP.

The proposed project is included in the financially constrained portion of the Transportation 2030 Plan and 2005 TIP.

§93.116 The proposed project would not cause or contribute to any new localized CO or PM<sub>10</sub> violations or increase the frequency or severity of any existing CO or PM<sub>10</sub> violations in CO and PM<sub>10</sub> non-attainment and maintenance areas.

Operations of the Build Alternative would not increase daily trips within the Highway 101 project limits or vehicle miles traveled in the region. The anticipated reduction in congestion on Highway 101 would improve traffic flow, incrementally reducing CO levels to below No Build levels

at some roadway segments within the Highway 101 project limits. No CO or PM<sub>10</sub> violations would result from operations of the proposed project. The proposed project would not violate state or federal standards.

§93.117 The proposed project must comply with PM<sub>10</sub> control measures that are contained in the applicable implementation plan.

PM<sub>10</sub> control measures are not available for the San Francisco Bay Area since the BAAQMD does not have an implementation plan for PM<sub>10</sub>. The No Build and Build Alternatives would not change VMT in the region. However, the proposed project would improve roadway conditions, which would result in lower PM<sub>10</sub> concentrations. If a federal PM<sub>10</sub> attainment plan were required in the future, Caltrans would identify appropriate control measures for PM<sub>10</sub> emissions.

Based on the above, the proposed project satisfies USEPA's project-level conformity requirements (40 CFR Part 93). *Refer to Appendix K for the conformity determination.*

### 3.13 Noise

#### 3.13.1 Regulatory Setting

The FHWA and Caltrans guidelines establish methods and criteria for evaluating and mitigating highway traffic noise effects in compliance with the National Environmental Policy Act (NEPA). These noise analysis methods and abatement criteria are also in compliance with the requirements stemming from the California Environmental Quality Act (CEQA). *The work plan for this project's noise study was approved in September 2003.*

#### State and Federal Guidelines for Noise Impact Evaluation

The noise impact evaluation criteria for the proposed project are in agreement with the Noise Abatement Criteria (NAC) established by the FHWA in *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR Part 772, 2006) and criteria adopted by Caltrans in *Traffic Noise Analysis Protocol* (Protocol) (Caltrans, 2006). For residential land uses, parks, schools, and hospitals, the FHWA outdoor noise criterion is 67 dBA, and the interior noise criterion is 52 dBA. Table 13.3-1, Activity Categories and Noise Abatement Criteria, shows noise criteria for these and other land use categories.

According to the Protocol, traffic noise impacts occur when one or both of the following occurs: 1) the project results in a substantial noise increase; 2) predicted noise levels approach or exceed the NAC. A traffic noise impact will also occur when the predicted noise levels of the project approach within 1 dBA or exceed the Noise Abatement Criteria shown in Table 13.3-1. Noise abatement measures are considered for this project when predicted future peak hour traffic noise levels are equal to or exceed 66 dBA.

**Table 3.13-1: Activity Categories and Noise Abatement Criteria**

<b>Activity Category</b>	<b>NAC, Hourly A-Weighted Noise Level, dBA Leg(h)</b>	<b>Description of Activity Category</b>
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
Source: 23 CFR Part 772, 2006		

The Caltrans Protocol states that if it is predicted that there would be traffic noise impacts, all reasonable and feasible noise abatement measures must be identified and implemented. The abatement must provide a minimum of 5 dBA of noise reduction to be considered feasible. Additional feasibility criteria include topography, access requirements (for driveways, ramps, etc.), the presence of local cross streets, other noise sources in the area, and safety considerations.

Greater noise reductions are encouraged as long as they can be achieved under the reasonableness guidelines. The overall reasonableness of noise abatement is determined by considering a multitude of factors including but not necessarily limited to the following:

- A. Cost of the abatement
- B. Absolute noise levels
- C. Change in noise levels
- D. Noise abatement benefits
- E. Date of development along the highway
- F. Life cycle of abatement measures<sup>1</sup>
- G. Environmental impacts of abatement construction
- H. Views (opinions) of affected residents
- I. Input from the public and local agencies
- J. Social, economic, environmental, legal, and technological factors

The cost of the abatement for residential areas is compared to a calculated Reasonable Allowance per Residence. Noise abatement that exceeds the cost allowance is not considered reasonable. *The determination of "reasonableness" of each of the barriers is based on cost and number of benefited residences for each soundwall. The reasonable allowance is considered to be the maximum amount that should reasonably be spent on noise abatement and is used for comparative purposes only.* Normally, noise abatement is not designed for the second-floor level. However, noise abatement

<sup>1</sup> It is normally not considered reasonable to construct a wall where planned future use would limit its useful life to less than 15 years.

designed to provide a 5-dBA noise reduction for the second-floor level without exceeding the modified allowance is considered within the scope of reasonableness. (Caltrans, 2006)

The Protocol identifies four scenarios under which noise impacts or abatement considerations for a project may need to be re-analyzed, as follows:

- a) There has been a significant change in project design concept and /or scope from that of the most recent environmental analysis, or
- b) A significant period of time has passed since the most recent environmental analysis, generally considered to be three years between project milestones, e.g. Record of Decision to Right-of-Way Certification, or
- c) An undeveloped land becomes planned, designed and programmed, after the analysis, but before the date of public knowledge, or
- d) An undeveloped land becomes developed after the date of public knowledge (disclosure of impacts, if any, but abatement not considered).

### **Noise Barriers and Noise Reflection**

The construction of noise barriers (soundwalls) sometimes generates concern that single or parallel sound barrier configurations will provide surfaces that “bounce” noise, and thus increase noise levels for some receivers. Studies show that single barrier configurations (barriers on one side of the highway only) reflect noise toward the opposite side of the highway. The noise increase on the opposite side, however, is typically 1 to 2.4 dBA, which is barely perceptible to the human ear. Performance of parallel noise barriers (barriers running along opposite sides of the highway) can decrease slightly because of noise reflections between the two barriers. Performance degrades less than 3 dbA when the ratio of the distance between opposite barriers to the height of the barriers is greater than ten to one. Because the distance to height ratio of barriers proposed for the Highway 101 HOV Lane Widening Project is greater than ten to one, the performance degradation of the parallel barriers would not be perceivable by the human ear. No adverse noise effects would result from the construction of these walls.

## **3.13.2 Affected Environment**

### **3.13.2.1 NOISE FUNDAMENTALS**

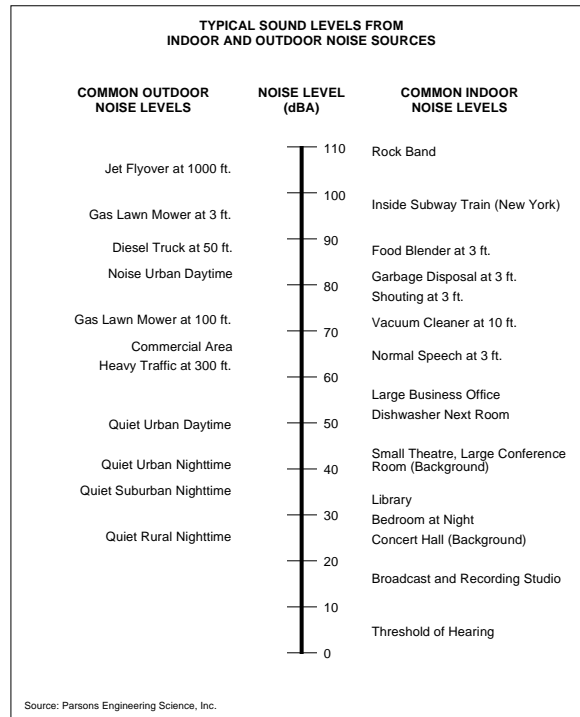
Noise is unexpected or undesired sound. Most noise in the project area is traffic related. Noise is transmitted by pressure waves through the atmosphere (sound waves) and is defined by these characteristics:

- **Frequency** refers to the length of a single sound wave, or how many sound waves pass one point in one second (cycles per second). Frequency determines the pitch of the sound – from low to high. The unit for frequency is Hertz (Hz). The human ear can detect sound in the range of 16 (low) to 20,000 (high) Hertz.

- **Amplitude** is the height of the sound wave and determines the intensity of sound. A high amplitude sound wave sounds louder than a sound wave of the same frequency at low amplitude. The units are decibels (dB) and are described logarithmically. Therefore, a doubling of wave height does not result in a doubling of decibels; instead, a doubling of sound energy results in a 3-dB increase in sound.

The average healthy ear can barely perceive noise level changes of 3 dB or less. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as being twice or half as loud. As discussed previously, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy would result in a barely perceptible change in sound level.

Humans perceive the same amplitude as louder at some frequencies than at others. In measuring sound, to account for the frequency response of the human ear, adjustments are applied at differing frequencies to reflect the average individual's sensitivity to sound. For noise associated with traffic and similar human activity, these adjustments are referred to as A-scale weighting. Noise levels are reported in terms of A-weighted decibels, or dBA. Figure 3.13-1 shows typical A-weighted noise levels.



**Figure 3.13-1: Typical A-Weighted Noise Levels**

Noise levels in our daily environment fluctuate over time. Various terms have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in Caltrans/FHWA traffic noise analysis:

- ***Equivalent Sound Level (Leq)*** represents an average of the sound energy occurring over a specified period. Leq is, in effect, the steady-state sound level that, in a given period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The Noise Abatement Criteria (NAC) used by Caltrans and FHWA use an Leq that averages A-weighted sound over a one-hour period of time. This Leq is referred to as Leq(h).
- ***Maximum Sound Level (Lmax)*** is the highest instantaneous sound level measured during a specified period.
- ***Insertion Loss (I.L.)*** is the actual noise level reduction at a specific receiver due to construction of a noise barrier between the noise source (traffic) and the receiver. Generally, it is the net effect of the soundwall attenuation and the loss due to ground effects.

As sound travels over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

***Geometric spreading***—The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line rather than a stationary point. From a line source, the sound level attenuates (drops off) by 3 dB per doubling of distance from the source.

***Ground absorption***—Most often, the noise path between the highway and the observer is very close to the ground. When this ground path is reflective like a parking lot or a smooth body of water, no ground attenuation is assumed. If, however, the path is acoustically absorptive (like soft dirt, grass, or scattered bushes and trees), it is assumed that the sound drops off an additional 1.5 dB per doubling of distance.

***Atmospheric effects***—Atmospheric conditions, such as wind or air temperature, can have a substantial effect on noise levels when noise receptors are located more than 60 meters (200 feet) from a highway.

### **3.13.2.2 EXISTING HIGHWAY 101 NOISE LEVELS**

Noise measurements were conducted in the project vicinity from April 19 through April 26, 2004. During that time, sensitive land use areas and the location and height of existing property walls were identified. All noise measurements were conducted in accordance with the FHWA guidelines outlined in *Measuring of Highway Related Noise* (FHWA-DP-96-046).

Existing noise levels in the project corridor were measured at 18 locations representing sensitive land uses, such as homes, businesses, and motels. Short-term measurements were made at 11 of these locations, while long-term measurements were conducted at seven locations. The dominant noise source at all measurement sites was traffic on Highway 101. Local street traffic contributed at some of the measurement sites, but was substantially less than the highway traffic noise. Short-term measurements were 20 minutes each in duration. Long-term measurements were for a minimum of

24 hours, during which the noise level data were stored at 20-minute intervals. The interval data were stored in the instrument's internal memory, which allowed the highest traffic noise hour to be identified during data analysis and graphical examination of the results.

Short-term measurements were adjusted to the peak-hour traffic noise level by comparison with the highest noise level of a nearby long-term measurement. In addition, a calibration "K" factor was applied where modeled results were substantially higher than measured results (Caltrans 1998). A "K" factor of -1.9 was applied at receptor location R87 to adjust for modeled versus measured traffic noise levels. A "K" factor -3.8 was applied to R90 to R95, due to an existing brick wall and earthen berm combination that was not easily modeled. The adjusted short-term peak hour traffic noise levels range between 61 and 74 dBA and are summarized in Table 3.13-2, Short-Term Noise Measurement Results. A summary of the long-term noise monitoring results is shown in Table 3.13-3, Long-Term Noise Measurement Results.

The monitoring results indicate that the existing traffic noise levels already approach or exceed the NAC at many locations along the project alignment. According to the long-term monitoring results, the peak noise hours occur during the morning commute at locations along both sides of Highway 101. Noise levels are lower during the evening commute hours. Monitoring locations are shown on Figure A (Sheets 1 through 15) in Appendix A.



**Table 3.13-2: Short-Term Noise Measurements Results**

Site No.	Street Address, City	Land Use <sup>1</sup>	Noise Abatement Category (Criterion) <sup>2</sup>	Meter Location	Measurement Dates	Start Time	Measured Leq, dBA <sup>3</sup>	Adjusted Peak-Hour Leq, dBA <sup>4</sup>	Adjusted Using Long-Term Site
ST1	5100 Montero Way, Petaluma	HM	B (67)	Near Bldg.	4/20/04	9:25 AM	65.8	68	LT1
ST1A	5135 Montero Way, Petaluma	HM	B (67)	Near Bldg.	4/20/04	9:25 AM	75.5	78	LT1
ST2	606 Stony Point Road, Petaluma	SFR	B (67)	Rear Yard	4/19/04	4:28 PM	70.6	74	LT1
ST3	1425 Stony Point Road, Petaluma	SFR	B (67)	Front Yard	4/20/04	2:17 PM	68.0	70	LT2
ST4	1109 Debbie Hill Road, Cotati	SFR	B (67)	Front Yard	4/20/04	4:48 PM	63.8	67	LT3
ST5	1187 Debbie Hill Road, Cotati	SFR	B (67)	Rear Yard	4/22/04	12:33 PM	58.9	61	LT3
ST6	539 West Sierra Avenue, Cotati	MFR	B (67)	Rear Yard	4/21/04	4:15 PM	67.0	70	LT4
ST7	441 W. School Street, Cotati	SFR	B (67)	Rear Yard	4/22/04	9:58 AM	67.5	69	LT5
ST8 <sup>5</sup>	7309 Old Redwood Highway, Rohnert Park	SFR	B (67)	Rear Yard	4/23/04	9:54 AM	67.2	68	LT7
ST9	6800 Commerce Boulevard, Rohnert Park	MFR	B (67)	Front Yard	4/23/04	9:14 AM	68.0	69	LT7
ST10	6500 Redwood Drive #126, Rohnert Park	HM	B (67)	Near Bldg.	4/23/04	8:35 AM	72.0	73	LT7
<p>Notes:</p> <p>1 – SFR = Single-Family Residential; MFR = Multi-Family Residential; HM = Hotel/Motel.</p> <p>2 – According to Caltrans Traffic Noise Analysis Protocol.</p> <p>3 – All short-term measured noise levels are a 20-minute Leq.</p> <p>4 – Measurements conducted during off-peak hours were adjusted to the peak-hour Leq based on a comparison with long-term noise levels measured near short-term measurement sites and are listed in the last column.</p> <p>5 – This property will be demolished as a result of the improvements project.</p> <p>Source: Parsons, 2005.</p>									

**Table 3.13-3: Long-Term Noise Measurements Results**

Site No.	Street Address, City	Land Use <sup>1</sup>	Noise Abatement Category (Criterion) <sup>2</sup>	Meter Location	Measurement Dates	Start Time	Duration, No. of Hours	Measured Peak Hour Leq, dBA <sup>3</sup>	Peak-Hour Time
LT1	300 Stony Point Road, #227, Petaluma	MH	B (67)	Rear Yard	4/19 – 4/21	3:30 PM	45	75	5AM, 6AM
LT2	207-209 Orchard Lane, Petaluma	MFR	B (67)	Rear Yard	4/20 – 4/21	12:00 PM	28	68	7AM
LT3	900 Birch Lane, Cotati	SFR	B (67)	Side Yard	4/20 – 4/22	4:05 PM	46	69	7AM
LT4	8877 Benedetti Court, Cotati	SFR	B (67)	Side Yard	4/21 – 4/26	12:40 PM	120	67	7AM
LT5	417 Christensen Circle, Cotati	SFR	B (67)	Rear Yard	4/21 – 4/22	2:00 PM	25	73	7AM, 8AM
LT6	278 Braden Court, Cotati	SFR	B (67)	Rear Yard	4/21 – 4/23	6:00 PM	41	68	6AM, 7AM, 8AM
LT7	67 Alma Avenue, Rohnert Park	SFR	B (67)	Rear Yard	4/22 – 4/26	5:00 PM	90	64	7AM
Notes: 1 – SFR = Single-Family Residential; MFR = Multi-Family Residential, MH = Mobile Home Park. 2 – According to Caltrans Traffic Noise Analysis Protocol. 3 – The highest measured hourly noise level recorded during the long-term measurement period. Source: Parsons, 2005									

### 3.13.3 Environmental Consequences

Noise impacts are assessed by comparing the future (year 2030) Build Alternative condition with the existing condition. The greatest noise generation from a roadway is when volumes are high and speeds are still close to free flow; this “worst case” condition is referred to as Level of Service C (LOS C) by traffic engineers. To approximate the worst case LOS C scenario for the Year 2030 Build condition, the noise analysis assumed freeway volumes of 1,800 vehicles per lane per hour traveling at approximately 105 km/h (65 mph). The volumes used for the HOV lanes were 1,500 vehicles per lane per hour at a speed of 105 km/h (65 mph). The truck climbing lane volume used in the analysis was 175 vehicles per lane per hour at a speed of 56 km/h (35 mph). The projected traffic volumes for the year 2030 were used for ramps, but capped at 1,000 vehicles per lane per hour to maintain the greatest noise generation potential. The speeds used for ramp traffic were 56 km/h (35 mph) for straight ramps and 32 km/h (20 mph) for loop ramps.

The Caltrans highway noise prediction computer model, SOUND 2000, PC Version 3.2, was used for the noise computations. This model is based on the highway traffic noise prediction method specified in FHWA-RD-77-108 (FHWA, 1978). Table 3.13-4, Predicted Future Noise and Barrier Analysis summarizes the results of the predicted levels at the representative receptor locations. The levels summarized in Table 3.13-14 include Option A for the Highway 101 / SR 116 Interchange with a combination soundwall S91/S95 at that interchange. Variations at the Highway 101 / SR 116 Interchange are shown in the following tables:

- Table 3.13-5, Predicted Future Noise and Barrier Analysis Without Soundwall S95, shows predicted noise levels at the Highway 101 / SR 116 interchange, under Option A, without the combination soundwall S91/S95.
- Table 3.13-6, Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B, shows predicted noise levels at the Highway 101 / SR 116 Interchange, with the combination soundwall S91/S95.
- Table 3.13-7, Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B Without Soundwall S95, shows predicted noise levels at the Highway 101 / SR 116 interchange, under Option B without the combination soundwall. *This is included in the Preferred Alternative.*

As shown in the tables, the difference between the predicted No-Build and Build traffic noise levels would be negligible (2 dBA or less) at the representative receptors. These noise differences between No-Build and Build conditions would be primarily due to the presence of High Occupancy Vehicle (HOV) lanes in the Build case. The predicted Build Alternative peak hour Leq(h) at the representative receptors ranges from 62 to 78 dBA, exceeding the NAC at most locations. *Option B with the combination soundwall was withdrawn from the project because it does not meet FHWA guidelines for cost effectiveness.* Noise abatement measures considered are described in Section 3.13.4, Avoidance, Minimization and/or Mitigation Measures.

### 3.13.4 Avoidance, Minimization and/or Mitigation Measures

Tables 3.13-4 through 3.14-7, Predicted Future Noise and Barrier Analysis, list predicted noise levels without barriers (soundwalls) and with barriers of various heights. Recommended barrier heights and locations are shown on Figure A (Sheets 1 through 15) in Appendix A. All barrier heights and locations are based on preliminary engineering. The tables and descriptions in this section include some locations where soundwalls are not feasible and others where soundwalls would not meet the Caltrans criteria for calculated Reasonable Allowance per Residence. *Refer to Table 3.13-8 for the preliminary reasonableness determination for all soundwalls.* The plan drawings in Figure A in Appendix A show only soundwalls that are considered both feasible and reasonable. *The noise barrier determinations presented herein are preliminary; the identification of reasonable and feasible noise abatement may be refined during final design.* Final decisions concerning noise barriers will be made upon completion of the project design and public involvement processes.

#### Locations Where Soundwalls Would Meet Feasible and Reasonable Criteria

**Soundwall S19** would be on the southbound side of Highway 101 from the Petaluma Boulevard north off-ramp to just past Willow Brook. This wall would reduce highway traffic noise at 51 mobile homes in the Leisure Lake Village mobile home park (represented by receptors R1 to R8).

**Soundwall S80** would be on the northbound side of Highway 101. The wall starts at just after station 78+20 and ends near the *exit* of the Highway 101 off-ramp to West Sierra Avenue. The wall would reduce highway traffic noise at nine single-family residences (represented by receptors R55 to R59).

**Soundwall S84** would be on the northbound side of Highway 101 at the shoulder where the highway is on fill. The wall would also span the West Sierra Avenue overpass bridge. The wall would reduce highway traffic noise at four single-family residences and 16 affected first floor units in four multi-family buildings (represented by receptors R62 to R64).

**Soundwall S90** would be on the northbound side of Highway 101 from just after West Sierra Avenue to just past East Cotati Avenue. The wall would reduce highway traffic noise at 13 single-family residences, one church, and two multi-family buildings having nine affected first floor units (represented by receptors R65 to R73).

**Soundwall S91** (SR 116 Interchange Option A) would be along the southbound side of Highway 101 between Richardson Lane and Highway 116. The soundwall would be along the shoulder of the highway and would end at the southbound Highway 101 on-ramp from Highway 116. The wall would provide protection for 24 single-family residences (represented by receptors R75 to R83) from highway traffic noise.

Table 3.13-4: Predicted Future Noise and Barrier Analysis\*\*

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION	
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft) Leq(h) I.L.		3.0 m (10 ft) Leq(h) I.L.		3.7 m (12 ft) Leq(h) I.L.		4.3 m (14 ft) Leq(h) I.L.		4.9 m (16 ft) Leq(h) I.L.		
R1	MH	73 <sup>E</sup>	75	75	2	B (67)	A/E	73	2	72	3	70 <sup>T</sup>	5	69 <sup>R,5</sup>	6	67	8	S19/ Shoulder
R2 <sup>S</sup>	MH	69 <sup>E</sup>	71	72	3	B (67)	A/E	70	2	70	2	68 <sup>T</sup>	4	67 <sup>R</sup>	5	66	6	
R3 <sup>C</sup>	MH	75 <sup>E</sup>	77	78	3	B (67)	A/E	74	4	72	6	70 <sup>T</sup>	8	68 <sup>R</sup>	10	67	11	
R3A <sup>S</sup>	MH	70 <sup>E</sup>	72	72	2	B (67)	A/E	70	2	69	3	67 <sup>T</sup>	5	66 <sup>R,5</sup>	6	65	7	
R4 <sup>6</sup>	MH	75 <sup>M-LT1</sup>	77	76	1	B (67)	A/E	73	3	71	5	69 <sup>T</sup>	7	67 <sup>R</sup>	9	66	10	
R4A <sup>S</sup>	MH	70 <sup>E</sup>	72	72	2	B (67)	A/E	70	2	69	3	67 <sup>T</sup>	5	66 <sup>R,5</sup>	6	65	7	
R5	MH	75 <sup>E</sup>	77	77	2	B (67)	A/E	73	4	71	6	69 <sup>T</sup>	8	67 <sup>R</sup>	10	66	11	
R6	MH	75 <sup>E</sup>	77	76	1	B (67)	A/E	73	3	71	5	69 <sup>T</sup>	7	68 <sup>R,5</sup>	8	66	10	
R7 <sup>S</sup>	MH	70 <sup>E</sup>	72	72	2	B (67)	A/E	70	2	68	4	67	5	66 <sup>R,T</sup>	6	65	7	
R8	MH	66 <sup>E</sup>	68	69	3	B (67)	A/E	67	2	66	3	65	4	64 <sup>R,T</sup>	5	63	6	
R12	SFH	73 <sup>E</sup>	74	75	2	B (67)	A/E	71	4	70	5	68 <sup>T</sup>	7	67 <sup>R,5</sup>	8	66	9	Shoulder <sup>8</sup>
R12A	SFH	67 <sup>E</sup>	68	69	2	B (67)	A/E	67	2	66	3	65 <sup>T</sup>	4	64 <sup>R</sup>	5	63	6	
R13 <sup>C,6</sup>	SFH	74 <sup>M-ST2</sup>	77	77	3	B (67)	A/E	73	4	71	6	69 <sup>T</sup>	8	67 <sup>R</sup>	10	66	11	
R14	SFH	73 <sup>E</sup>	74	75	2	B (67)	A/E	72	3	71	4	69 <sup>T</sup>	6	67 <sup>R</sup>	8	66	9	
R18	SFH	70 <sup>M-ST3</sup>	71	72	2	B (67)	A/E	72	0	72	0	72	0	72	0	72	0	No Barrier
R19	SFH	70 <sup>E</sup>	71	72	2	B (67)	A/E	72	0	72	0	72	0	72	0	72	0	
R9	MOT	68 <sup>M-ST1</sup>	71	72	4	B (67)	A/E	70	2	69	3	68	4	68	4	68	4	No Barrier
R10 <sup>C</sup>	MOT	78 <sup>E</sup>	77	78	0	B (67)	A/E	75	3	73	5	71 <sup>R,T</sup>	7	70	8	68	10	ROW <sup>8</sup>
R11	MOT	78 <sup>M-ST1A</sup>	77	78	0	B (67)	A/E	75	3	73	5	71 <sup>T</sup>	7	69 <sup>R</sup>	9	68	10	
R15	SFH	65 <sup>E</sup>	67	67	2	B (67)	A/E	67	0	66	1	65	2	65 <sup>T</sup>	2	64	3	ROW <sup>8</sup>
R16	SFH	68 <sup>E</sup>	69	70	2	B (67)	A/E	69	1	68	2	67	3	66 <sup>T</sup>	4	65 <sup>R</sup>	5	
R17 <sup>C</sup>	SFH	68 <sup>M-LT2</sup>	73	74	6	B (67)	A/E	71	3	70 <sup>T</sup>	4	68	6	67	7	66 <sup>R,5</sup>	8	

## Notes:

- 1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
  - 2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
  - 3 - M - Measured noise level; E - Estimated noise level.
  - 4 - A/E = Approach or Exceed NAC.
  - 5 - Barrier height recommended to meet requirements at adjacent receptor(s).
  - 6 - Measurement site had a property wall.
  - 7 - Measurement site of residence that will be demolished to make room for an on ramp.
  - 8 - Refer to the text in this section for a description of conditions at this location.
- R - Minimum required height based on Caltrans Noise Analysis Protocol.  
S - Second row receptor.  
C - Critical design receiver.  
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005.

Table 3.13-4: Predicted Future Noise and Barrier Analysis\*\*

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS																BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)											
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)			
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.		
R33	SFR	67 <sup>M-ST4</sup>	67	68	1	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier	
R34	SFR	66 <sup>E</sup>	66	67	1	B (67)	A/E	-	-	-	-	-	-	-	-	-	-		
R35	SFR	62 <sup>E</sup>	62	64	2	B (67)	None	-	-	-	-	-	-	-	-	-	-		
R36	SFR	68 <sup>E</sup>	68	69	1	B (67)	A/E	65 <sup>T</sup>	4	63 <sup>R</sup>	6	62	7	61	8	61	8	ROW <sup>8</sup>	
R37	SFR	67 <sup>E</sup>	67	68	1	B (67)	A/E	65 <sup>T</sup>	3	65	3	64	4	63 <sup>R</sup>	5	62	6		
R38 <sup>C</sup>	SFR	70 <sup>E</sup>	70	72	2	B (67)	A/E	68 <sup>T</sup>	4	67	5	65	7	63 <sup>R</sup>	9	62	10		
R39	SFR	61 <sup>M-ST5</sup>	61	62	1	B (67)	None	-	-	-	-	-	-	-	-	-	-	No Barrier	
R40	SFR	62 <sup>E</sup>	62	64	2	B (67)	None	-	-	-	-	-	-	-	-	-	-		
R30	SFR	68 <sup>E</sup>	67	68	0	B (67)	A/E	65	3	64	4	62 <sup>R,5,T</sup>	6	61	7	60	8	Shoulder and ROW <sup>8</sup>	
R31	SFR	66 <sup>E</sup>	65	66	0	B (67)	A/E	65	1	64	2	63	3	62 <sup>T</sup>	4	61 <sup>R</sup>	5		
R32 <sup>C</sup>	SFR	69 <sup>M-LT3</sup>	67	69	0	B (67)	A/E	69 <sup>T</sup>	0	66	3	64	5	62 <sup>R</sup>	7	61	8		
R41	SFR	64 <sup>E</sup>	63	65	1	B (67)	None	-	-	-	-	-	-	-	-	-	-	No Barrier	
R55	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	69 <sup>T</sup>	3	67 <sup>R</sup>	5	66	6	65	7	64	8	S80/ Shoulder	
R56 <sup>C</sup>	SFR	71 <sup>E</sup>	74	74	3	B (67)	A/E	72	2	70	4	68 <sup>R,T</sup>	6	67	7	65	9		
R57	SFR	67 <sup>M-LT4</sup>	73	73	6	B (67)	A/E	70	3	69	4	67 <sup>R,T</sup>	6	66	7	64	9		
R58	SFR	66 <sup>E</sup>	69	69	3	B (67)	A/E	67	2	66	3	64 <sup>T</sup>	5	63 <sup>R,5</sup>	6	62	7		
R59	SFR	63 <sup>E</sup>	66	67	4	B (67)	A/E	65	2	64	3	63	4	62 <sup>R,T</sup>	5	61	6		
R60 <sup>C</sup>	SFR	71 <sup>E</sup>	74	75	4	B (67)	A/E	70	5	68	7	66 <sup>T</sup>	9	64 <sup>R</sup>	11	63	12	ROW <sup>8</sup>	
R61	SFR	69 <sup>E</sup>	72	73	4	B (67)	A/E	71	2	69	4	68	5	66 <sup>R,T</sup>	7	65	8		
R62	SFR	66 <sup>E</sup>	68	69	3	B (67)	A/E	66	3	65	4	64 <sup>R,T</sup>	5	63	6	62	7	S84/ Bridge and Shoulder	
R63	SFR	66 <sup>E</sup>	68	69	3	B (67)	A/E	66	3	65 <sup>T</sup>	4	64 <sup>R</sup>	5	63	6	63	6		
R64 <sup>C</sup>	MFR	70 <sup>M-ST6</sup>	72	73	3	B (67)	A/E	68 <sup>R,T</sup>	5	67	6	65	8	64	9	63	10		

## Notes:

- Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
  - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
  - M - Measured noise level; E - Estimated noise level.
  - A/E = Approach or Exceed NAC.
  - Barrier height recommended to meet requirements at adjacent receptor(s).
  - Measurement site had a property wall.
  - Measurement site of residence that will be demolished to make room for an on ramp.
  - Refer to the text in this section for a description of conditions at this location.
  - R - Minimum required height based on Caltrans Noise Analysis Protocol.
  - S - Second row receptor.
  - C - Critical design receiver.
  - T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-4: Predicted Future Noise and Barrier Analysis\*\*

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS															BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R65	MFR	71 <sup>E</sup>	73	73	2	B (67)	A/E	68 <sup>T</sup>	5	66 <sup>R</sup>	7	65	8	64	9	63	10	S90/ ROW
R68	MFR	65 <sup>E</sup>	65	66	1	B (67)	A/E	65	0	65	1	64 <sup>T</sup>	2	64	2	63	3	
R69	MH	64 <sup>E</sup>	65	66	2	B (67)	A/E	66	0	65	1	65 <sup>T</sup>	1	64	2	64	2	
R70	SFR	72 <sup>E</sup>	73	74	2	B (67)	A/E	73	1	71	3	69 <sup>T</sup>	5	67 <sup>R</sup>	7	66	8	
R71	SFR	73 <sup>M-LT5</sup>	74	75	2	B (67)	A/E	70 <sup>T</sup>	5	68	7	66 <sup>R</sup>	9	65	10	64	11	
R72 <sup>C</sup>	SFR	75 <sup>E</sup>	76	76	1	B (67)	A/E	72 <sup>T</sup>	4	69	7	67 <sup>R</sup>	9	66	10	64	12	
R73	SFR	74 <sup>E</sup>	75	76	2	B (67)	A/E	75	1	74	2	72 <sup>T</sup>	4	70	6	68 <sup>R</sup>	8	
R87 <sup>7</sup>	SFR	68 <sup>M-ST8</sup>	71	72	4	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R90	SFR	62 <sup>E</sup>	65	66	4	B (67)	A/E	66	0	66	0	65 <sup>T</sup>	1	64	2	63	3	No Barrier
R91 <sup>6</sup>	SFR	64 <sup>M-LT7</sup>	67	68	4	B (67)	A/E	68	0	67	1	66 <sup>T</sup>	2	65	3	64	4	
R92A	SFR	61 <sup>E</sup>	64	65	4	B (67)	A/E	65	0	64	1	64 <sup>T</sup>	1	63	2	62	3	
R92	SFR	62 <sup>E</sup>	65	66	4	B (67)	A/E	66	0	66	0	66 <sup>T</sup>	0	64	2	63	3	
R93	SFR	63 <sup>E</sup>	66	67	4	B (67)	A/E	67	0	67	0	66 <sup>T</sup>	1	65	2	64	3	
R94	SFR	64 <sup>E</sup>	67	68	4	B (67)	A/E	68	0	68	0	67 <sup>T</sup>	1	65	3	64	4	
R95	SFR	64 <sup>E</sup>	67	67	3	B (67)	A/E	67	0	67	0	66 <sup>T</sup>	1	65	2	63	4	
R96	MFR	71 <sup>E</sup>	71	73	2	B (67)	A/E	72	1	71	2	69	4	68 <sup>R,T</sup>	5	67	6	S108/ Shoulder and ROW
R97 <sup>C</sup>	MFR	71 <sup>E</sup>	72	73	2	B (67)	A/E	72	1	71	2	69	4	68 <sup>R,T</sup>	5	67	6	
R97A <sup>S</sup>	MFR	65 <sup>E</sup>	66	67	2	B (67)	A/E	67	0	67	0	66	1	66	1	65 <sup>T</sup>	2	
R98	MFR	70 <sup>E</sup>	71	72	2	B (67)	A/E	71	1	70	2	69	3	68 <sup>T</sup>	4	67 <sup>R</sup>	5	
R98A	MFR	69 <sup>M-ST9</sup>	70	71	2	B (67)	A/E	71	0	70	1	69	2	68	3	67	4	
R99	COM	69 <sup>E</sup>	70	70	1	C (72)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R100	COM	69 <sup>E</sup>	70	70	1	C (72)	A/E	-	-	-	-	-	-	-	-	-	-	
R101	COM	68 <sup>E</sup>	69	70	2	C (72)	None	-	-	-	-	-	-	-	-	-	-	

## Notes:

- 1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
  - 2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel.
  - 3 - M - Measured noise level; E - Estimated noise level.
  - 4 - A/E = Approach or Exceed NAC.
  - 5 - Barrier height recommended to meet requirements at adjacent receptor(s).
  - 6 - Measurement site had a property wall.
  - 7 - Measurement site of residence that will be demolished to make room for an on ramp.
  - 8 - Refer to the text in this section for a description of conditions at this location.
- R - Minimum required height based on Caltrans Noise Analysis Protocol.  
S - Second row receptor.  
C - Critical design receiver.  
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-4: Predicted Future Noise and Barrier Analysis\*\*

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS																BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)											
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)			
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.		
R66	SFR	63 <sup>E</sup>	66	67	4	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier	
R67	SFR	60 <sup>E</sup>	63	64	4	B (67)	None	-	-	-	-	-	-	-	-	-	-		
R75	SFR	69 <sup>M-ST7</sup>	72	73	4	B (67)	A/E	70	3	68 <sup>R,T</sup>	5	67 <sup>R,T</sup>	6	66	7	65	8	S91/ Shoulder	
R76	SFR	69 <sup>E</sup>	73	73	4	B (67)	A/E	71	2	70	3	68 <sup>R,T</sup>	5	67	6	66	7		
R76A <sup>S</sup>	SFR	66 <sup>E</sup>	69	70	4	B (67)	A/E	69	1	68	2	67	3	65 <sup>T</sup>	5	64	6		
R77	SFR	68 <sup>E</sup>	72	72	4	B (67)	A/E	70	2	69	3	68	4	66 <sup>R,T</sup>	6	65	7		
R78	SFR	67 <sup>E</sup>	70	71	4	B (67)	A/E	69	2	68 <sup>T</sup>	3	66	5	65 <sup>R,5</sup>	6	64	7		
R79 <sup>C</sup>	SFR	70 <sup>E</sup>	72	73	3	B (67)	A/E	69	4	68 <sup>T</sup>	5	66	7	65 <sup>R,5</sup>	8	64	9		
R80A <sup>S</sup>	SFR	67 <sup>E</sup>	69	69	2	B (67)	A/E	68	1	66	3	65	4	64 <sup>R,T</sup>	5	63	6		
R80	SFR	68 <sup>M-LT6</sup>	71	71	3	B (67)	A/E	68	3	67 <sup>T</sup>	4	66	5	65 <sup>R,5</sup>	6	64	7		
R81	SFR	67 <sup>E</sup>	69	70	3	B (67)	A/E	68	2	67	3	66	4	65 <sup>R,T</sup>	5	64	6		
R82	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	70	2	69	3	67	5	66 <sup>R,5,T</sup>	6	64	8		
R83	SFR	67 <sup>E</sup>	70	70	3	B (67)	A/E	69	1	68	2	66	4	65 <sup>R,T</sup>	5	64	6		
R84 <sup>S,C</sup>	SFR	65 <sup>E</sup>	68	68	3	B (67)	A/E	67	1	66	2	65	3	64	4	63 <sup>R,T</sup>	5	S91/ Shoulder of On Ramp S95 Shoulder of the Roadway	
R85	SFR	64 <sup>E</sup>	66	67	3	B (67)	A/E	66	1	65	2	64 <sup>T</sup>	3	63	4	63	4		
R86	SFR	63 <sup>E</sup>	65	66	3	C(72)	None	-	-	-	-	-	-	-	-	-	-		
R104	SFR	65 <sup>E</sup>	67	68	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier	
R105	SFR	63 <sup>E</sup>	65	66	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-		
R106	SFR	66 <sup>E</sup>	68	68	2	B (67)	A/E	-	-	-	-	-	-	-	-	-	-		
R107	SFR	64 <sup>E</sup>	66	67	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-		
R108	MOT	73 <sup>M</sup>	75	76	3	B (67)	A/E	73	3	72	4	70	6	69	7	67 <sup>R,5,T</sup>	9	ROW <sup>8</sup>	
R109 <sup>C</sup>	MOT	67 <sup>E</sup>	69	70	3	B (67)	A/E	68	2	67	3	66	4	65	5	64 <sup>R,T</sup>	6		
R88A	MFR	61 <sup>E</sup>	64	65	4	B (67)	None	-	-	-	-	-	-	-	-	-	-	No Barrier	

## Notes:

- Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
  - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM - hotel/motel.
  - M - Measured noise level; E - Estimated noise level.
  - A/E = Approach or Exceed NAC.
  - Barrier height recommended to meet requirements at adjacent receptor(s).
  - Measurement site had a property wall.
  - Measurement site of residence that will be demolished to make room for an on ramp.
  - Refer to the text in this section for a description of conditions at this location.
  - Minimum required height based on Caltrans Noise Analysis Protocol.
  - Second row receptor.
  - Critical design receiver.
  - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005



**Table 3.13-5: Predicted Future Noise and Barrier Analysis Without Soundwall S95\*\***

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS															BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R75	SFR	69 <sup>M-ST7</sup>	72	73	4	B (67)	A/E	70	3	68 <sup>R,T</sup>	5	67	6	66	7	65	8	S91/ Shoulder and Off Ramp
R76	SFR	70 <sup>E</sup>	73	73	3	B (67)	A/E	71	2	70	3	68 <sup>R,T</sup>	5	67	6	66	7	
R76A <sup>S</sup>	SFR	66 <sup>E</sup>	69	70	4	B (67)	A/E	69	1	68	2	67	3	65 <sup>R,T</sup>	5	64	6	
R77	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	70	2	69	3	68	4	66 <sup>R,T</sup>	6	65	7	
R78	SFR	67 <sup>E</sup>	70	71	4	B (67)	A/E	69	2	68 <sup>T</sup>	3	66	5	65 <sup>R,5</sup>	6	64	7	
R79 <sup>C</sup>	SFR	69 <sup>E</sup>	72	73	4	B (67)	A/E	69	4	68 <sup>T</sup>	5	66	7	65 <sup>R,5</sup>	8	64	9	
R80A <sup>S</sup>	SFR	67 <sup>E</sup>	69	69	2	B (67)	A/E	68	1	66	3	65	4	64 <sup>R,T</sup>	5	63	6	
R80	SFR	68 <sup>M-LT6</sup>	71	71	3	B (67)	A/E	68	3	67 <sup>T</sup>	4	66	5	65 <sup>R,5</sup>	6	64	7	
R81	SFR	66 <sup>E</sup>	69	70	4	B (67)	A/E	69	1	67	3	66	4	65 <sup>R,T</sup>	5	64	6	
R82	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	70	2	69	3	67	5	66 <sup>T</sup>	6	65 <sup>R,5</sup>	7	
R83	SFR	67 <sup>E</sup>	70	70	3	B (67)	A/E	69	1	68	2	67	3	66 <sup>T</sup>	4	65 <sup>R</sup>	5	
R84	SFR	65 <sup>E</sup>	68	68	3	B (67)	A/E	68	0	68	0	67	1	66	2	65	3	
R85	SFR	63 <sup>E</sup>	66	67	4	B (67)	A/E	67	0	67	0	67	0	66	1	66	1	
R86	COM	63 <sup>E</sup>	65	66	3	C (72)	None	-	-	-	-	-	-	-	-	-	-	

## Notes:

- 1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
- 2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
- 3 - M - Measured noise level; E - Estimated noise level.
- 4 - A/E = Approach or Exceed NAC.
- 5 - Barrier height recommended to meet requirements at adjacent receptor(s).
- 6 - Measurement site had a property wall.
- 7 - Measurement site of residence that will be demolished to make room for an on ramp.
- 8 - Refer to the text in this section for a description of conditions at this location.
- R - Minimum required height based on Caltrans Noise Analysis Protocol.
- S - Second row receptor.
- C - Critical design receiver.
- T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

**Table 3.13-6: Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B\*\***

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS															BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R75	SFR	69 <sup>M-ST7</sup>	72	73	4	B (67)	A/E	70	3	68 <sup>R,T</sup>	5	67	6	66	7	65	8	S91/ Shoulder
R76	SFR	70 <sup>E</sup>	73	73	3	B (67)	A/E	71	2	70	3	68 <sup>R,T</sup>	5	67	6	66	7	
R76A <sup>S</sup>	SFR	66 <sup>E</sup>	69	70	4	B (67)	A/E	69	1	68	2	67	3	65 <sup>R,T</sup>	5	64	6	
R77	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	70	2	69	3	68	4	66 <sup>R,T</sup>	6	65	7	
R78	SFR	67 <sup>E</sup>	70	71	4	B (67)	A/E	69	2	68 <sup>T</sup>	3	66	5	65 <sup>R,5</sup>	6	64	7	
R79 <sup>C</sup>	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	69	3	68 <sup>T</sup>	4	66	6	65 <sup>R,5</sup>	7	64	8	
R80A <sup>S</sup>	SFR	66 <sup>E</sup>	69	69	3	B (67)	A/E	67	2	66	3	65	4	63 <sup>R,T</sup>	6	62	7	
R80	SFR	68 <sup>M-LT6</sup>	71	71	3	B (67)	A/E	68	3	66 <sup>T</sup>	5	65	6	64 <sup>R,5</sup>	7	63	8	
R81	SFR	66 <sup>E</sup>	69	69	3	B (67)	A/E	67	2	65	4	64 <sup>T</sup>	5	63 <sup>R,5</sup>	6	62	7	
R82	SFR	69 <sup>E</sup>	72	69	0	B (67)	A/E	66	3	65 <sup>T</sup>	4	64	5	63 <sup>R,5</sup>	6	63	6	
R83 <sup>C</sup>	SFR	67 <sup>E</sup>	70	69	2	B (67)	A/E	67	2	66	3	64 <sup>T</sup>	5	63 <sup>R,5</sup>	6	62	7	
R84 <sup>S,C</sup>	SFR	65 <sup>E</sup>	68	68	3	B (67)	A/E	67	1	65	3	64	4	63	5	62 <sup>R,T</sup>	6	S91/ Shoulder of On Ramp S95 Shoulder of the Roadway
R85	SFR	63 <sup>E</sup>	66	66	3	B (67)	A/E	65	1	64	2	63	3	62 <sup>T</sup>	4	61 <sup>R</sup>	5	
R86	COM	63 <sup>E</sup>	65	65	2	C (72)	None	-	-	-	-	-	-	-	-	-	-	

**Notes:**

- 1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
- 2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
- 3 - M - Measured noise level; E - Estimated noise level.
- 4 - A/E = Approach or Exceed NAC.
- 5 - Barrier height recommended to meet requirements at adjacent receptor(s).
- 6 - Measurement site had a property wall.
- 7 - Measurement site of residence that will be demolished to make room for an on ramp.
- 8 - Refer to the text in this section for a description of conditions at this location.
- R - Minimum required height based on Caltrans Noise Analysis Protocol.
- S - Second row receptor.
- C - Critical design receiver.
- T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

**Table 3.13-7: Predicted Future Noise and Barrier Analysis for  
SR 116 Interchange Option B Without Soundwall S95\*\***

REC. NO.	LAND USE <sup>2</sup>	EXISTING NOISE LEVELS <sup>1,3</sup> Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS																BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E <sup>4</sup> or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)											
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)			
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.		
R75	SFR	69 <sup>M-ST7</sup>	72	73	4	B (67)	A/E	70	3	68 <sup>R,T</sup>	5	67	6	66	7	65	8	S91/ Shoulder and Off Ramp	
R76	SFR	70 <sup>E</sup>	73	73	3	B (67)	A/E	71	2	70	3	68 <sup>R,T</sup>	5	67	6	66	7		
R76A <sup>S</sup>	SFR	66 <sup>E</sup>	69	70	4	B (67)	A/E	69	1	68	2	67	3	65 <sup>R,T</sup>	5	64	6		
R77	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	70	2	69	3	68	4	66 <sup>R,T</sup>	6	65	7		
R78	SFR	67 <sup>E</sup>	70	71	4	B (67)	A/E	69	2	68 <sup>T</sup>	3	66	5	65 <sup>R,5</sup>	6	64	7		
R79 <sup>C</sup>	SFR	69 <sup>E</sup>	72	72	3	B (67)	A/E	69	3	68 <sup>T</sup>	4	66	6	65 <sup>R,5</sup>	7	64	8		
R80A <sup>S</sup>	SFR	67 <sup>E</sup>	69	69	2	B (67)	A/E	67	2	66	3	65	4	64 <sup>R,T</sup>	5	63	6		
R80	SFR	68 <sup>M-LT6</sup>	71	71	3	B (67)	A/E	68	3	66 <sup>T</sup>	5	65	6	64 <sup>R,5</sup>	7	63	8		
R81	SFR	66 <sup>E</sup>	69	69	3	B (67)	A/E	67	2	66	3	65 <sup>T</sup>	4	64 <sup>R</sup>	5	63	6		
R82	SFR	69 <sup>E</sup>	72	69	0	B (67)	A/E	67	2	66 <sup>T</sup>	3	64 <sup>T</sup>	5	63 <sup>R,5</sup>	6	63	6		
R83	SFR	67 <sup>E</sup>	70	69	2	B (67)	A/E	67	2	66	3	65 <sup>T</sup>	4	64 <sup>R</sup>	5	64	5		
R84 <sup>S</sup>	SFR	65 <sup>E</sup>	68	68	3	B (67)	A/E	68	0	67	1	67	1	66	2	66 <sup>T</sup>	2		
R85	SFR	63 <sup>E</sup>	66	66	3	B (67)	A/E	66	0	66	0	66	0	66	0	65	1		
R86	COM	63 <sup>E</sup>	65	65	2	C (72)	None	-	-	-	-	-	-	-	-	-	-		

## Notes:

- 1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
- 2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
- 3 - M - Measured noise level; E - Estimated noise level.
- 4 - A/E = Approach or Exceed NAC.
- 5 - Barrier height recommended to meet requirements at adjacent receptor(s).
- 6 - Measurement site had a property wall.
- 7 - Measurement site of residence that will be demolished to make room for an on ramp.
- 8 - Refer to the text in this section for a description of conditions at this location.
- R - Minimum required height based on Caltrans Noise Analysis Protocol.
- S - Second row receptor.
- C - Critical design receiver.
- T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
- \*\* The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

**Table 3.13-8: Summary of Recommended Barriers and Barrier Allowances**

Barrier No.	Receptor No.	No. and Type of Benefited Receptors <sup>1</sup>	Barrier Location	Approximate Highway 101 Station	Barrier Height/Total Length	Reasonable Barrier Allowance <sup>2</sup>	
						Per Residence	Per Wall
S18	R10 and R11	1 HM	Right of Way	16+70 to 18+14	3.7 m (12 ft) / 144 m (472 ft)	\$50,000	\$50,000
S19	R1 to R8	51 MH	Shoulder	15+95 to 21+40	4.3 m (14 ft) / 546 m (1791 ft)	\$54,000	\$2,754,000
S27	R12 to R14	6 SFR	Shoulder	24+64 to 29+04	4.3 m (14 ft) / 443 m (1453 ft)	\$54,000	\$324,000
S28	R15 to R17	3 SFR	Right of Way	26+23 to 30+57	4.9 m (16 ft) / 434 m (1424 ft)	\$50,000	\$150,000
S66	R30 to R32	5 SFR	Shoulder/ Right of Way	62+74 to 69+31	3.7 m (12 ft) / 4.3 m (14 ft) / 4.9 m (16 ft) / 676 m (2218 ft)	\$46,000	\$230,000
S69	R36 to R38	3 SFR	Right of Way	66+89 to 70+00	3.0 m (10 ft) / 3.7 m (12 ft) / 4.3 m (14 ft) / 314 m (1030 ft)	\$50,000	\$150,000
S80	R55 to R59	9 SFR	Right of Way/ ROW	78+90 to 82+38	3.0 m (10 ft) / 4.3 m (14 ft) / 348 m (1142 ft)	\$50,000	\$450,000
S81	R60 and R61	2 SFR	Right of Way	79+48 to 81+58	4.3 m (14 ft) / 210 m (689 ft)	\$54,000	\$108,000
S84	R62 to R64	4 SFR and 16 MFR	Bridge/ Shoulder	82+06 to 86+00	2.4 m (8 ft) / 3.0 m (10 ft) / 3.7 m (12 ft) / 394 m (1293 ft)	\$48,000	\$960,000
S90	R65 to R73	13 SFR, 1 Church, and 9 MFR	Right of Way	85+49 to 92+26	3.0 m (10 ft) / 3.7 m (12 ft) / 4.3 m (14 ft) / 4.9 m (16 ft) / 690 m (2264 ft)	\$52,000	\$1,196,000

**Notes:**

1 – Type of Benefited Receptor: SFR = Single Family Residences; MRF = Multi Family Residential Units; MH = Mobile Homes; HM = Hotel/Motel.

2 – Reasonable Barrier Allowance per Caltrans Traffic Noise Analysis Protocol.

3 – The totals are for Bridge Option A with Soundwall S95

**Table 3.13-8: Summary of Recommended Barriers and Barrier Allowances  
(Continued)**

Barrier No.	Receptor No.	No. and Type of Benefited Receptors <sup>1</sup>	Barrier Location	Approximate Highway 101 Station	Barrier Height/Total Length	Reasonable Barrier Allowance <sup>2</sup>	
						Per Residence	Per Wall
S91 (Bridge Opt. A)	R75 and R83	22 SFR	Shoulder of Road and Off-Ramp	88+80 to 95+44	3.0 m (10 ft) 3.7 m (12 ft) 4.3 m (14 ft) 4.9 m (16 ft)/ 675 m (2214 ft)	\$50,000	\$1,100,000
S91/S95 (Bridge Opt. A)	R75 to R84	26 SFR	Shoulder of Road and Off-Ramp	88+80 to 95+44	3.0 m (10 ft) 3.7 m (12 ft) 4.3 m (14 ft) 4.9 m (16 ft)/ 675 m (2214 ft)	\$50,000	\$1,244,000
			Shoulder of Road and Bridge	93+94 to 97+33	4.9 m (16 ft)/339 m (1112 ft)	\$36,000	
S91 (Bridge Opt. B)	R75 to R83	22 SFR	Shoulder of Road and Off-Ramp	88+80 to 95+44	3.0 m (10 ft) 3.7 m (12 ft) 4.3 m (14 ft) 4.9 m (16 ft)/ 675 m (2214 ft)	\$50,000	\$1,100,000
S91/S95 (Bridge Opt. B)	R75 to R85	26 SFR	Shoulder of Road and Off-Ramp	88+80 to 95+44	3.7 m (12 ft) 4.3 m (14 ft) 4.9 m (16 ft) / 676 m (2218 ft)	\$36,000	\$1,244,000
			Shoulder of Road and Bridge	93+94 to 97+33	4.9 m (16 ft)/339 m (1112 ft)	\$31,000	
S108	R96 to R98	15 MFR	Right of Way	104+50 to 108+55	4.3 m (14 ft) 4.9 m (16 ft)/ 402 m (1319 ft)	\$48,000	\$720,000
S111	R108 and R109	1 HM	Right of Way	111+04 to 113+05	4.9 m (16 ft)/ 212 m (696 ft)	\$50,000	\$50,000
<b>Totals<sup>3</sup></b>		<b>1 Church 2 HM 51 MH 40 MFR 71 SFR</b>	--	--	<b>5,895 m (19,340 ft)</b>	--	<b>\$10,830,000</b>

**Notes:**

1 – Type of Benefited Receptor: SFR = Single Family Residences; MRF = Multi Family Residential Units; MH = Mobile Homes; HM = Hotel/Motel.

2 – Reasonable Barrier Allowance per Caltrans Traffic Noise Analysis Protocol.

3 – The totals are for Bridge Option A with Soundwall S95

**Soundwall combination S91 and S95 (SR 116 Interchange Option A)** would be along the southbound side of Highway 101 between Richardson Lane and Highway 116, and Soundwall S95 would be located along the southbound side of Highway 101. Soundwall S95 would span the Highway 116 overpass bridge. When combined with Soundwall S95, Soundwall S91 would protect two more single-family residences (represented by receptor R84) from highway traffic noise, under bridge option A. A total of 26 single-family residences would be protected by this soundwall combination.

**Soundwall S91 (SR 116 Interchange Option B)** would be along the southbound side of Highway 101 between Richardson Lane and Highway 116. The soundwall would be along the shoulder of the highway and would end at the southbound Highway 101 on-ramp from Highway 116. The wall would provide protection for 24 single-family residences (represented by receptors R75 to R83) from highway traffic noise. *This is included in the Preferred Alternative.*

**Soundwall combination S91 and S95 (SR 116 Interchange Option B)** would be on the southbound side of Highway 101 between Richardson Lane and Highway 116, along the shoulder of the highway, and would end at the southbound Highway 101 on-ramp from Highway 116. Soundwall S95 would be along the southbound side of Highway 101 and would span Highway 116 overpass bridge. Soundwall S91, when combined with Soundwall S95, would protect four more single-family residences (represented by receptors R84 and R85) from highway traffic noise. A total of 28 single family residences would be protected by this soundwall combination.

*Option B with the combination soundwall was withdrawn from the project because it does not meet FHWA guidelines for cost-effectiveness.* **Soundwall S108** would be on the northbound side of Highway 101 from just before Arlen Drive to Copeland Creek. The soundwall would reduce highway traffic noise at six multi-family buildings with 15 affected first floor units (represented by receptors R96 to R98). Soundwall S108 cannot be positioned at the ideal location for noise abatement, since it would take away public access to a portion of the Caltrans right-of-way that is currently being used as bicycle/pedestrian trail. Therefore, the soundwall was positioned between the public area and Highway 101, which results in a loss of benefit to the apartment building represented by R98A.

### **Locations Where Soundwalls Would Exceed Reasonable Allowance**

Soundwalls at the following receptor locations would achieve a 5-dBA reduction in traffic noise and be feasible to construct, but would not be cost-effective as determined by Caltrans' Calculated Reasonable Allowance per Residence. (Reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting *and are shown in Table 3.13-8.*) The receptor locations for these areas are shown in Appendix A, Build Alternative Plan Drawings. The following paragraphs describe the locations.

**Receptor 10** represents the pool area at the Dollar Inn motel, which is on the east side of Highway 101, just north of Old Redwood Highway. Although the analysis indicates that the future traffic noise would exceed the NAC at this location, the soundwall required to abate highway traffic noise for this single area would be approximately 155 meters (508 feet) long.

**Receptors R12, R13, and R14** represent six single-family residences on the west side of Highway 101 in the vicinity of Orchard Lane. A soundwall to protect these six residences from highway traffic noise would be 440 meters (1,444 feet) long.

**Receptors R15, R16, and R17** represent three single-family residences on the east side of Highway 101, near Orchard Lane. The soundwall required to abate highway traffic noise for these three residences would be 434 meters (1,424 feet) long.

**Receptors R30, R31, and R32** represent five single-family residences on the east side of Highway 101, north of West Railroad Avenue. The soundwall required to abate highway traffic noise for these residences would be approximately 660 meters (2,165 feet) long.

**Receptors R36, R37, and R38** represent three single-family residences on the west side of Highway 101, north of West Railroad Avenue. The soundwall required to abate highway traffic noise for these residences would be 311 meters (1,020 feet) long.

**Receptors R60 and R61** represent two single-family residences on the west side of Highway 101, south of West Sierra Avenue. The soundwall required to abate traffic noise for these two residences would be 210 meters (689 feet) long.

**Receptor R109** represents the motel pool area at the Rohnert Park Best Western motel on the west side of Highway 101, south of the Rohnert Park Expressway. The soundwall required to abate highway traffic noise at the pool would be approximately 520 meters (1,706 feet) long.

### **Areas Where Noise Abatement Is Not Warranted or Feasible**

Some areas along the project corridor would receive noise impacts for which there is no apparent feasible and reasonable abatement. State guidelines for reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting *and preliminary reasonableness determination for all soundwalls are shown in Table 3.13-8*. The receptor locations for these areas are shown in Appendix A, Build Alternative Plan Drawings. The following paragraphs describe the locations and explain why abatement is not feasible or reasonable.

**Receptor R9** represents the Quality Inn motel that is along the northbound side of Highway 101 near the Old Redwood Highway. A soundwall along the on-ramp alignment would not attenuate traffic noise from the Old Redwood Highway; therefore it would not achieve the required 5-dBA benefit. There is no other location in this area to place a soundwall.

**Receptors R18 and R19** represent single-family residences on the southbound side of Highway 101 near the Pepper Road access ramp to southbound Highway 101. The receptors are near Stony Point Road, which is a contributing noise source. Because a soundwall along the Pepper Road access ramp would not attenuate traffic noise from Stony Point Road, the soundwall would not achieve the required 5-dBA noise reduction. There is no other location in this area to place a soundwall.

**Receptors R33 to R35** represent single-family residences on the southbound side of Highway 101 just north of West Railroad Avenue. It is not feasible to construct a soundwall in this area due to the topographical characteristics at this location.

**Receptor R41** represents a single-family residence on the northbound side of Highway 101 between stations 73+00 and 74+00. It is not feasible to abate for highway traffic noise in this area due to the distance between R41 and the highway.

**Receptors R66 to R67** are on the southbound side of Highway 101 just north of West Sierra Avenue. It is not feasible to construct a soundwall in this area due to the topographical characteristics at this location.

**Receptors R84 and R85** represent single-family residences located on the southbound side of Highway 101 just south of SR 116. Traffic noise at these receptors cannot be abated with Soundwall S91 alone due to the topographical characteristics at this location. If a soundwall is placed at the edge of southbound Highway 101 along the bridge portion that extends over Highway 116 (Soundwall 95), R84 would benefit (two single-family residences) under bridge option A. Both receptors (four single-family residences) would benefit from the soundwall combination under bridge option B. (Refer to the discussion in this section of Soundwall S91 and Soundwall combination S91 and S95).

**Receptor R87** represents two single-family residences on the northbound side of Highway 101 just north of the Highway 116 underpass. The residences would be acquired for highway right-of-way.

**Receptors R90 to R95** represent single-family residences along the northbound side of Highway 101 between Southwest Boulevard and Arlene Drive. It is not feasible to abate the traffic noise due to an existing property wall. The addition of a new soundwall would not result in a 5-dBA decrease in the traffic noise level, since the existing wall is already achieving close to the maximum noise reduction that is possible.

**Receptor R98A** represents two multi-family residences with three affected first-floor units on the northbound side of Highway 101, just south of Copeland Creek. It is not feasible to abate the highway traffic noise in this area due to a public bicycle/pedestrian trail located between the residences and Highway 101. A soundwall could not be placed in this area so that it would properly abate the traffic noise for this receptor without disrupting the function of the trail.

**Receptors R104 to R107** represent single-family residences on the southbound side of Highway 101 between Copeland Creek and Redwood Drive. It is not feasible to abate the highway traffic noise in this area due to the distance of the residences from the highway and a partial shielding effect provided by intervening commercial buildings.



### 3.14 Energy

As the impact of the project in context of the countywide travel model is too small to demonstrate substantial energy impacts, in accordance with Caltrans' Standard Environmental Reference Guidelines,<sup>2</sup> a qualitative energy analysis was conducted. The information presented in this section is taken from the technical memorandum, *Technical Memorandum on Energy Impacts for the Highway 101 HOV Lane Widening and Improvements Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park* (Parsons 2005).

The energy impacts of transportation projects are typically divided into two components: (1) the direct energy required for ongoing operations, in this case, the use of petroleum-based fuels and alternative fuels for motor vehicle travel within the project area, and (2) the indirect energy required to produce the materials for and to carry out construction of the project. In the long term, the direct, or operating, energy requirements are usually greater and of primary importance. This discussion, therefore, focuses on the direct energy requirements for ongoing Highway 101 operations with and without the proposed project.

By 2030, without capacity improvements to Highway 101, congested traffic conditions would prevail in the traffic study area; the freeway would be unable to serve the projected demand. Due to insufficient mainline capacity for the forecast volumes, bottlenecks and queues would develop at certain locations along the mainline. Low travel speeds and long delays would be prevalent during peak hours. Such congested traffic conditions contribute to inefficient energy consumption as vehicles use extra fuel while idling in stop-and-go traffic or moving at slow speeds on a congested roadway.

While the Build Alternative would not eliminate all capacity problems in 2030, it would allow the highway to carry on average about 12 percent more of the total peak-hour travel demand than the No-Build Alternative. Under no-build conditions, Highway 101 within the traffic study area would be able to accommodate only 84 percent of forecast 2030 travel demand.

The Build Alternative would improve average travel speeds and thereby reduce average travel times during both peak hours. Improved travel speeds would translate to a 26 to 42 percent reduction in travel time. The Build Alternative would reduce peak-hour delay at some bottlenecks by over 90 percent. It would reduce overall delay by five to 10 minutes, a 51 to 88 percent reduction, depending on the peak hour (a.m. and p.m.) and direction.

By removing bottlenecks in the study area, reducing delay and improving travel times, the Build Alternative also would reduce traffic diversion to local streets ("cut-through" traffic) by commuters who under no-build conditions, would divert to local streets to avoid bottlenecks and traffic queues on the mainline.

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<sup>2</sup> Source: <http://www.dot.ca.gov/ser/vol1/sec3/physical/ch13energy/chap13.htm>

The computer model used to study future traffic conditions concludes that the Build Alternative would reduce the countywide vehicle miles traveled (VMT) and countywide vehicle hours traveled (VHT) when compared to the No-Build Alternative.<sup>3</sup> Under the Build Alternative, annual countywide VMT would decrease by 31 million kilometers (19 million miles) and annual countywide VHT would decrease by two million hours when compared to the No-Build Alternative. These reductions reflect improved travel times and reduced delay under the Build Alternative. Because vehicle energy consumption is directly proportional to VMT, lower VMT under the Build Alternative would translate to energy savings.

The HOV lanes provided under the Build Alternative would offer dedicated peak hour capacity and a high level of traffic service to transit and carpool vehicles, which would substantially improve travel time for intercity buses and carpooling commuters. Not only would transit travel time be reduced but transit schedule reliability would be improved. The improved speeds and schedule reliability would work as incentives for commuters and other travelers to carpool and/or take advantage of local and express buses that would move freely along the HOV lanes. To the extent that benefits to HOV lane users influence more single-occupant-vehicle drivers to switch to HOVs, the Build Alternative would contribute to energy savings. The proposed project is anticipated to have no adverse impact on direct energy use compared to the No-Build Alternative. No energy mitigation measures would be needed.

### 3.15 Biological Environment

*A Natural Environment Study/Biological Assessment (NES/BA) (Parsons 2006), Preliminary Wetland Delineation Report (Parsons 2005), Initial Site Assessment for the California Tiger Salamander and California Red-legged Frog (Parsons 2003), and a California Red-legged Frog Report (Parsons 2005)* were prepared for the Highway 101 HOV Lane Widening Project. Biological resource studies consisted of a comprehensive records and literature search, a reconnaissance survey of the entire project corridor, habitat assessment and protocol surveys for special-status plant and wildlife species, and a delineation/assessment of wetlands and other waters of the United States (U.S.). *A Focused Corridor Biological Assessment for the Sonoma County Distinct Population Segment (DPS) of the California Tiger Salamander (Parsons, 2004)* was prepared and submitted to the U.S. Fish and Wildlife Service (USFWS) to initiate formal consultation under Section 7 of the Federal Endangered Species Act. *A Biological Assessment for Fish Species* was also prepared and was submitted to the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) in May 2007 as part of informal consultation under Section 7 for potential impacts to anadromous fish species under NOAA Fisheries jurisdiction. This section of the environmental document presents findings of these reports and studies for vegetation and wildlife communities, wetlands and other waters of the U.S., threatened and endangered species, and invasive species.

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<sup>3</sup> The countywide VMT represents the total distance traveled by all vehicles in Sonoma County and countywide VHT represents the total hours traveled by all vehicles in Sonoma County.

### 3.15.1 Natural Communities

#### 3.15.1.1 AFFECTED ENVIRONMENT

Land uses along the proposed project are primarily rural and agricultural, as described in Section 3.2.1, Existing and Future Land Use. Vegetation is mostly ruderal/disturbed, non-native grassland, ornamental landscape planted with coast redwood (*Sequoia sempervirens*), and agricultural planted with grapes (*Vitis vinifera*); there are few remaining natural areas. Various waterways traverse the corridor, some in concrete-lined channels or culverts and others in their natural watercourse.

Five biological communities occur in the vicinity of the project corridor: non-native annual grassland; ruderal/disturbed, including ornamental landscape and agriculture; seasonal and freshwater emergent wetlands; willow riparian scrub; and coyote brush scrub. Preliminary investigations indicate that it is highly unlikely that the project area contains vernal pools or Santa Rosa Plain listed plants. Protocol-level presence/absence surveys for these special-status plant species were performed during 2006 with negative findings. These plant species are discussed further in Section 3.15.3.2, paragraph two.

A description of each community and its associated wildlife assemblage is provided below.

#### Non-Native Grassland

This community is typically found on fine-textured soils, which may range from moist, possibly even waterlogged during the rainy season, to very dry during the dry season. It is primarily composed of non-native annual grasses although native annual forbs (“wildflowers”) may also be present during years of favorable precipitation. Non-native grassland communities are found in the valleys and foothills throughout much of California. Characteristic species include wild oats (*Avena* spp.), bromes (*Bromus* spp.), Italian ryegrass (*Lolium multiflorum*), California poppy (*Eschscholzia californica*), lupine (*Lupinus* spp.), and baby blue-eyes (*Nemophila menziesii*).

Grasslands provide foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles. Wildlife species typically associated with grasslands include western skink (*Eumeces skiltonianus*), Pacific gopher snake (*Pituophis melanoleucus catenifer*), common garter snake (*Thamnophis sirtalis*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), mule deer (*Odocoileus hemionus*), western meadowlark (*Sturnella neglecta*), and savannah sparrow (*Passerculus sandwichensis*). Grasslands also provide important foraging habitat for raptors such as the American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), and red-tailed hawk (*Buteo jamaicensis*).

Non-native grasslands within the project vicinity are found on Meacham Hill. The dominant plant species in this community within the project area include wild oats, bromes, and Italian ryegrass.

### **Ruderal/Disturbed, Including Urban Ornamental Landscape and Agriculture**

A distinguishing characteristic of urban habitats is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries. Native and introduced animal species that are tolerant of human activities often thrive in urban habitats. These species include western fence lizard (*Sceloporus occidentalis*), barn swallow (*Hirundo rustica*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), house mouse (*Mus musculus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis virginianus*).

Common weeds found along the project corridor included Italian ryegrass, wild oats, tall mustard (*Sisymbrium altissimum*), Harding grass (*Phalaris aquatica*), bristly ox-tongue (*Picris echinoides*), sow thistle (*Sonchus asper*), wild lettuce (*Lactuca serriola*), and paniculate willow-herb (*Epilobium brachycarpum*). Ornamental landscape plants associated with these weeds included periwinkle (*Vinca major*), English ivy (*Hedera helix*), oleander (*Nerium oleander*), and coast redwood (*Sequoia sempervirens*).

Agricultural areas in the project vicinity include pastureland, vineyards, and row crops.

### **Seasonal and Freshwater Emergent Wetlands**

Seasonal wetlands, including the aquatic environments of the floor of flood control channels, are often formed when ditches and depressions are excavated. Freeway ditches develop into seasonal wetlands by becoming populated by plants species such as semaphore grass (*Pleuropogon californicus*), spikerush (*Eleocharis macrostachya*), water knotweed (*Polygonum lapathifolium*), water evening primrose (*Ludwigia peploides*), pennyroyal (*Mentha pulegium*), rabbitsfoot grass (*Polypogon monspeliensis*), barnyard grass (*Echinochloa crusgallii*), and eragrostoid sedge (*Cyperus eragrostis*). These plant species are either low-growing, tenacious perennials that tolerate the annual maintenance activities being carried out in the channels and ditches, or are annuals that tolerate seasonal wetness and mowing, but later die after producing seed for the next season. The edges of such wetlands are often dominated by non-native annual weeds including annual ryegrass (*Lolium multiflorum*), alkali mallow (*Malvella leprosa*), peppergrass (*Lepidium latifolium*), and bristly ox-tongue (*Picris echinoides*). At Denman Flat, a seasonal wetland exists that is dominated by pennyroyal.

Freshwater marshes are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds as well as a variety of mammals, reptiles, and amphibians. Species that could use these areas in the project vicinity include Pacific tree frogs (*Hyla regilla*), bullfrogs (*Rana catesbeiana*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), yellow warbler (*Dendrocia petechia*), voles (*Microtis* spp.), shrews (*Sorex* spp.), and deer mouse.

Seasonal and freshwater emergent wetlands occur at the ditches near Old Redwood Highway, the seasonal wetlands north of Denman Flat, in the headwaters and tributaries to Laguna de Santa Rosa, and the ditches near SR 116. No vernal pools or swales were identified within the project vicinity.

### **Willow Riparian Scrub**

This community is found on relatively fine-grained alluvial soils and clays located in the floodplains of sub-perennial streams along canyons and creeks of the Coast Ranges. Characteristic species include red willow (*Salix laevigata*) and shining willow (*S. lucida* ssp. *lasiandra*).

Examples of wildlife that may occur in this community include Pacific tree frog, bushtit (*Psaltiriparus minimus*), Wilson's warbler (*Wilsonia canadensis*), black phoebe (*Sayornis nigricans*), Anna's hummingbird (*Calypte anna*), spotted towhee (*Pipilo maculatus*), raccoon, Virginia opossum, European starling, American crow (*Corvus brachyrhynchos*), Western scrub jay (*Aphelocoma californica*), house finch, house mouse, and Norway rat (*Ratus norvegicus*).

Willow riparian scrub was found along Copeland Creek and the Laguna de Santa Rosa in the Highway 101 corridor.

### **Coyote Brush Scrub**

Considered by some ecological workers as the northern version of soft chaparral, coyote brush scrubs are most prevalent on coastal slopes. However, inland scrubs that are dominated by *Baccharis* species are often associated with old disturbed sites, and thus may reflect a seral stage in the development of woodlands from bare ground. The dominant species is coyote brush (*Baccharis pilularis* var. *consanguinea*) but may also include species of buck brush (*Ceanothus* species), poison oak (*Toxicodendron diversilobum*), and cow parsnip (*Heracleum lanatum*), together with a whole host of annual forbs and grasses.

Coyote brush scrub provides foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles (see section on non-native grassland).

Coyote brush scrub was found in the vicinity of Willow Brook and on the north side of Meacham Hill near the headwaters of Laguna de Santa Rosa Creek.

#### **3.15.1.2 ENVIRONMENTAL CONSEQUENCES**

The No-Build Alternative would not result in new construction that would involve impacts to the biological environment in the project vicinity. Project effects on natural communities that would result from the Build Alternative (*Preferred Alternative*) are shown in Table 3.15-1. Mitigation measures for these impacts are proposed by respective vegetation community type in the following paragraphs.

**Table 3.15-1: Impacts to Natural Communities for the Build Alternative (hectares/acres)**

Affected Natural Communities	Area of Impact
Ruderal/Disturbed	16.0 ha/40.0 ac
Non-native Grassland	1.06 ha/2.61 ac
Seasonal/Freshwater Emergent Wetland/Open Water	0.281 ha/0.696 ac
Willow Riparian Scrub	0.03 ha/0.08 ac
Coyote Brush Scrub	0.38 ha/0.94 ac

**Ruderal/Disturbed**

The proposed project would permanently displace up to 16.0 ha (40.0 ac) of ruderal/disturbed vegetation at various locations along the Highway 101 corridor within the project limits.

**Non-native Grassland**

Approximately 1.06 ha (2.61 ac) of non-native grassland would be permanently displaced by the proposed project between Pepper Road and West Railroad Avenue.

**Seasonal/Freshwater Emergent Wetlands/Open Water**

The proposed project would affect up to 0.281 ha (0.696 ac) of seasonal and freshwater emergent wetlands and open water in ditches near Old Redwood Highway, at Willow Brook, in seasonal wetlands north of Denman Flat, in the headwaters and tributaries to Laguna de Santa Rosa, and in ditches near SR 116. *Pursuant to Executive Order 11990, Protection of Wetlands, Wetlands Only Practicable Alternative Finding is presented in Appendix I.*

**Willow Riparian Scrub**

Impacts to approximately 0.03 ha (0.08 ac) of willow riparian scrub located along Copeland Creek and the Laguna de Santa Rosa tributaries could occur as a result of bridge construction in those areas.

**Coyote Brush Scrub**

Approximately 0.38 ha (0.94 ac) of coyote brush scrub habitat in the vicinity of Willow Brook and the Laguna de Santa Rosa tributaries could be disturbed.

**3.15.1.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding or reducing new construction in natural habitat areas. The majority of the widening could be accomplished within the existing roadway median. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way takes and natural community impacts. Linear patches and disjunct segments of ruderal/disturbed vegetation and non-native grassland would be permanently affected by Highway 101 project construction. These losses

are not considered to be adverse because other vegetation community areas within the project vicinity are of higher quality and would be used by wildlife as an alternative and preferable habitat source. Compensation measures for unavoidable impacts to willow/riparian and coyote brush scrub vegetation communities potentially affording habitat for special-status species and to jurisdictional wetlands and other waters of the U.S. are described in their respective sections below.

### **3.15.2 Wetlands and Other Waters of the United States**

#### **3.15.2.1 REGULATORY SETTING**

Three primary regulations apply to undertakings that may affect wetlands or other waters of the United States, as follows:

##### **Section 404, Clean Water Act**

As established in Section 404 of the Clean Water Act (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) has final authority over the identification of wetlands and other waters of the U.S. in the project vicinity, including their jurisdiction, determination of area affected by the project, and type of permits and conditions required. Section 404 prohibits the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. In order for a project that affects wetlands to be approved and a permit to be obtained, it must be demonstrated that the proposed project is the least environmentally damaging. A “no net loss of wetland acreages or values” policy is established for mitigation of wetland impacts.

The USACE also administers the Habitat Quality Evaluation (HQE) process. This process was developed by the Sonoma County Vernal Pool Task Force<sup>4</sup> with the purpose of identifying wetland areas in the Santa Rosa Plain that potentially contain rare plant and animal species. These areas are further studied for their potential to be used for wetland and rare species protection, wetland creation, restoration, or enhancement.

##### **Section 401, Clean Water Act**

Concurrent with the determination of a project’s qualifications for an USACE permit is certification of the project’s compliance with California State water quality standards as regulated by the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. The water quality certification may include waste discharge requirements.

##### **Section 1600 et. Seq., California Fish and Game Code**

Actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement (“1602 permit”) with the California Department of Fish and Game (CDFG) in accordance with Section 1600 and following of the California Fish and Game Code. The Streambed Alteration Agreement effectively applies to any construction work between the banks of a

stream or within the floodplain of a waterway. The agreement typically establishes seasonal limits or work windows for construction activities.

### **3.15.2.2 AFFECTED ENVIRONMENT**

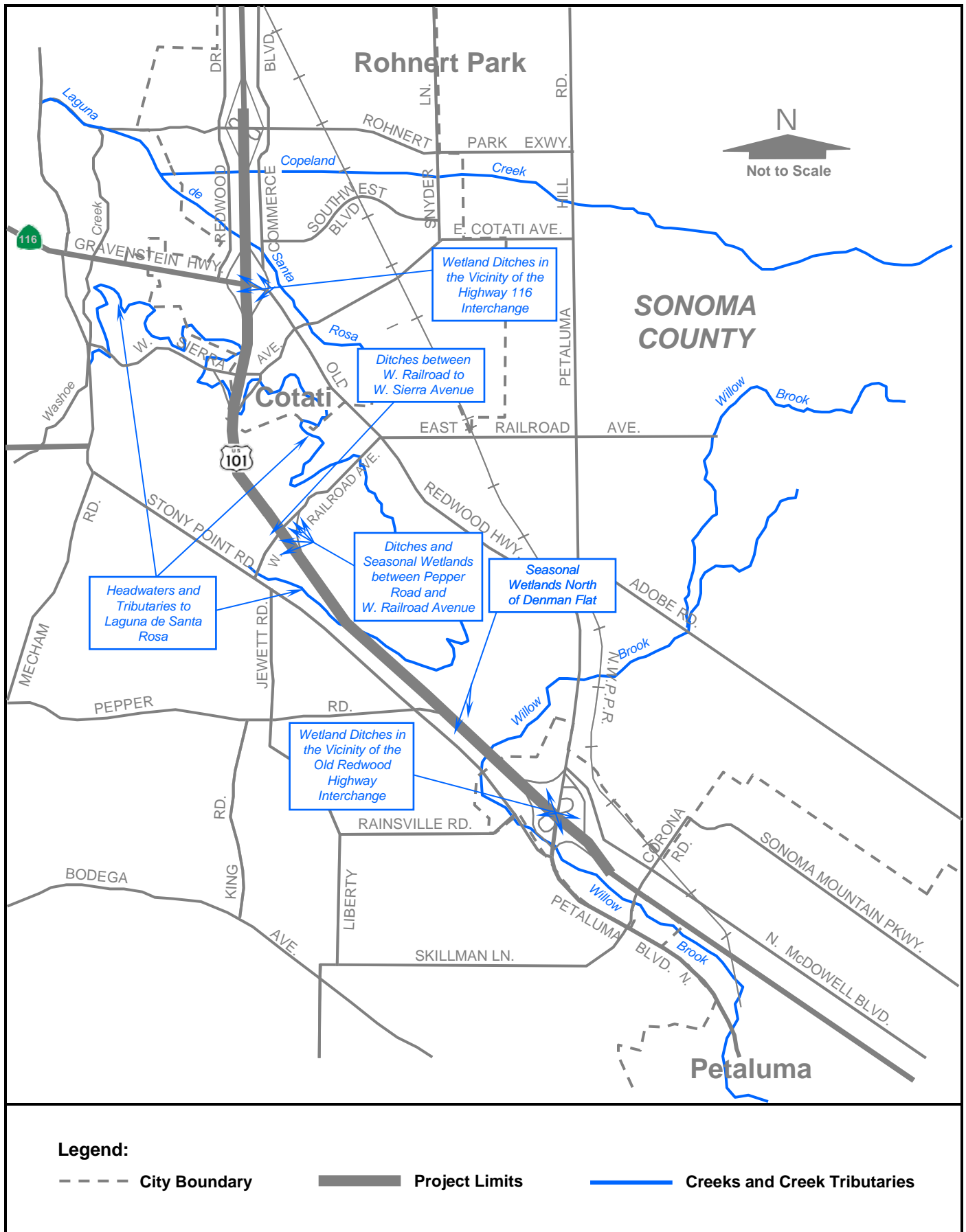
A delineation of potential jurisdictional wetlands and other waters of the U.S. in the proposed project vicinity was conducted on April 22, June 19, July 1, July 16, July 17, July 19, July 29, and July 30, 2003 *and from April to July 2006* in accordance with the Routine On-Site Determination Method as defined by the USACE. This delineation *was* submitted to the USACE *on April 9, 2007* for jurisdictional determination. *In response to their request, the preliminary wetland delineation and the Natural Environment Study/Biological Assessment (NES/BA) will be submitted to the California Regional Water Quality Control Board, San Francisco Bay Region for review.*

The jurisdictional features that were delineated along Highway 101 are shown on Figure 3.15-1 and on the Wetland Delineation Maps in Appendix G. Jurisdictional wetlands are determined by the presence of three indicators: wetlands soils, wetlands vegetation, and hydrology, or period of inundation. Other waters of the U.S. must possess a defined bed and bank and an ordinary high water mark (OHWM).

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<sup>4</sup> The Vernal Pool Task Force was composed of federal, state, and local agencies, local development and agricultural interests, and local environmental groups.





The wetland delineation also served to demonstrate the likely absence of vernal pools in the project area. Protocol-level presence/absence surveys for vernal pool listed plant species *were completed during July 2006* to complete the Habitat Quality Evaluation (HQE) process as required pursuant to the “1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may Affect Four Endangered Plant Species of the Santa Rosa Plain, California” (1998 Plant Programmatic Opinion) (Service 1998) and the Santa Rosa Plain Conservation Strategy. These surveys indicated that none of the four listed vernal pool plant species occur within the immediate project vicinity.

### 3.15.2.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new construction that would affect wetlands or other waters of the U.S. in the project corridor. The Build Alternative (*Preferred Alternative*) would permanently affect up to 0.281ha (0.696 ac)<sup>5</sup> of wetlands and other waters of the U.S. Both permanent and temporary (construction phase) impact areas are shown on the Wetland Delineation Maps in Appendix G. Table 3.15-2 reports the amounts of wetland or other waters resources within the project limits that would be permanently or temporarily filled.

Based on the amount of total permanent *and temporary* impacts to wetlands and other waters of the U.S. as a result of the HOV Lane Alternative with SR 116 Interchange Option B (included in the Preferred Alternative)—which is approximately 1.09 acres combined—it is anticipated that the project will require an individual permit. It is also anticipated that a Section 1602 Streambed Alteration Agreement with the CDFG would be required prior to construction.

<b>Table 3.15-2: Impacts to Wetlands and Other Waters of the U.S. Highway 101 HOV Lane Widening Project</b>				
<b>Location</b>	<b>With SR 116 Interchange Option A</b>		<b>With SR 116 Interchange Option B (included in the Preferred Alternative)</b>	
	<b>Permanent</b>	<b>Temporary</b>	<b>Permanent</b>	<b>Temporary</b>
	<b>hectares / acres</b>		<b>hectares / acres</b>	
<b>Total Wetlands</b>	0.222 / 0.549	0.152 / 0.374	0.257 / 0.636	0.146 / 0.361
<b>Total Other Waters of the U.S.</b>	0.024 / 0.060	0.014 / 0.034	0.024 / 0.060	0.014 / 0.034
<b>Total Wetlands/Waters Impacts</b>	<b>0.246 / 0.609</b>	<b>0.166 / 0.408</b>	<b>0.281 / 0.696</b>	<b>0.160 / 0.395</b>
Source: Parsons, 2006				

Pursuant to Executive Order 11990, Protection of Wetlands, a Wetlands Only Practicable Alternative Finding is provided in Appendix I.

<sup>5</sup> Total impacts to wetlands/other waters under Option B at the Highway 101/SR 116 Interchange.

**3.15.2.4 ALTERNATIVES ANALYSIS OF SR 116 INTERCHANGE OPTIONS WITH RESPECT TO SECTION 404 (B)(1) GUIDELINES**

*Section 404 (b)(1) of the Clean Water Act essentially prevents the adoption of a project alternative affecting wetlands and other waters of the U.S. if there is a practicable alternative that would avoid or reduce those impacts. Because Option B at the SR 116/Highway 101 Interchange would affect greater amounts of wetlands/other waters of the U.S. than Option A (although the differences are extremely small), analysis was conducted to determine whether the lesser-impacting Option A is practicable.*

*Option B at the SR 116 / Highway 101 Interchange was identified as part of the Preferred Alternative on the recommendation of the Project Development Team (PDT); the City of Cotati, as indicated in their comments on the DEIR; and SCTA, by unanimous vote at the September 11, 2006 Board Meeting. The reasons for this recommendation are as follows:*

*SR 116 interchange Option A included existing nonstandard features and deficiencies, such as less than standard mainline stopping sight distance and nonstandard vertical clearance. Also, current bridge spans are inadequate to accommodate ADA compliant Class II bike lanes and sidewalks. These nonstandard features would all remain if this option were included in the Preferred Alternative. Furthermore, under Option A, the existing SR 116 separation structure would be retained. This structure was constructed in 1956, and is over fifty years old. Although the bridge was widened in 1991, additional widening would be required in the median and at the outside edges to accommodate the proposed improvements. Seismic retrofit of the existing bridge would also be required with further modification.*

*Retaining these existing nonstandard and aging features is not considered prudent, given the scope of project improvements as a whole, and therefore this option was not recommended by project decision makers.*

*Under Option B, the mainline stopping sight distance and nonstandard vertical clearance would be upgraded to current standards, improving vehicular and pedestrian safety. Also, the existing separation structure would be replaced with a new structure that would be constructed to current geometric design and seismic standards. Thus, Option B replaces the existing deficiencies to provide a new facility that meets current standards, improves vehicular and pedestrian safety, and accommodates the circulation needs of Cotati. It was therefore recommended by the PDT, Cotati and SCTA for inclusion in the Preferred Alternative.*

*Although Option B would have slightly more permanent and temporary construction phase impacts to wetlands/waters than Option A, it was determined to be the practicable alternative, while Option A was not practicable.*

### 3.15.2.5 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

*Each element of the project was designed to have its least possible impacts on wetlands and waters of the U.S. The majority of the widening would occur in the median of the roadway. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way takes and impacts to wetlands and other waters of the U.S. Compensation requirements for impacts to wetlands and other waters of the U.S. will be determined through consultation with the USACE and Regional Water Quality Control Board, which will establish the compensation ratio and other measures to be implemented, based on their review of this *Environmental Assessment/Environmental Impact Report*, the *Wetlands Delineation Report*, and the *Natural Environment Study/Biological Assessment (NES/BA)*. Compensation will be identified for both permanent and temporary (construction phase) impacts of the project to ensure no net loss of wetlands. Caltrans/SCTA will provide mitigation through the purchase of wetland creation/enhancement credits at a USACE-approved mitigation bank.*

### 3.15.3 Threatened and Endangered Species

Special-status plant and wildlife species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. For purposes of this environmental document, candidate threatened or endangered species were addressed in the same manner as listed species, since they could be listed during later stages of project development.

#### 3.15.3.1 REGULATORY SETTING

A variety of laws seek to identify, avoid, minimize and mitigate for impacts to special-status wildlife and plant species, as summarized in the following paragraphs.

#### Federal Endangered Species Act

The Secretary of the Interior and the Secretary of Commerce are responsible under the federal Endangered Species Act of 1973 (ESA) for identifying endangered and threatened species and their critical habitat, carrying out programs for species conservation, and rendering opinions regarding the impact of proposed federal actions on endangered species. The ESA also outlines what constitutes unlawful taking, importation, sale, and possession of endangered species and specifies civil and criminal penalties for unlawful activities.

Biological assessments are required under Section 7(c) of the ESA if listed species or critical habitat may be present in the area affected by any major construction activity conducted by, or subject to issuance of a permit from, a federal agency as defined in Part 404.02. Under Section 7(a)(3) of the ESA, every federal agency is required to consult with the United States Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries)

on a proposed action if the agency determines that its undertaking may affect an endangered or threatened species.

### **Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The MBTA also prohibits disturbance or harassment of nesting migratory birds at any time during their breeding season.

### **California Endangered Species Act**

The California Endangered Species Act (CESA, Fish and Game Code Sections 2050-2098) establishes State policy to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The Fish and Game Commission is charged with establishing a list of endangered and threatened species. State agencies must consult with the California Department of Fish and Game (CDFG) to determine if a proposed project has the potential to jeopardize the continued existence of listed endangered, threatened, or candidate species.

The CDFG Code defines “take” (Section 86) and prohibits “taking” of species that are listed under the CESA, or fully protected under CDFG Code Sections 3511, 4700, and 5050. Significant impacts are defined as: a) direct mortality; b) permanent or temporary loss of occupied habitat that would result in mortality to or reduced productivity of at least one individual of the species; c) avoidance of biologically important habitat for substantial periods resulting in mortality to or reduced productivity of at least one individual of the species.

Section 2081 of the Fish and Game Code allows “take” of a species listed under the CESA. Take is defined as any act that involves direct mortality or other actions that may result in adverse impacts when attempting to take individuals of a listed species. Under Section 2081, CDFG may issue a permit to authorize take for scientific, educational or management purposes, or take that is incidental to otherwise lawful activities.

### **California Fish and Game Code Native Plant Protection Policy**

The goal of the California Native Plant Protection Policy (Policy) is to preserve, protect, and enhance endangered or rare plants of the state (Section 1900). Native plants are defined as plants that grow in a wild uncultivated state and which are normally found native to the plant life of the state (Section 1901). The California Fish and Game Commission may adopt regulations governing the taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants.

All state departments and agencies shall, in consultation with CDFG, use their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the identification,

delineation, and protection of habitat critical to the continued survival of endangered or rare native plants (Section 1911).

### California Fish and Game Code Section 1600

As described in Section 3.15.2.1, actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement (“1602 permit”) with the CDFG in accordance with Section 1600 of the California Fish and Game Code. The Streambed Alteration Agreement establishes time periods for construction and other conditions designed to protect streambed habitat areas, maintain flows, and minimize harm to wildlife.

#### 3.15.3.2 AFFECTED ENVIRONMENT

The USFWS and NOAA Fisheries were contacted for their listings of threatened, endangered, and candidate species that may occur in the project vicinity. Copies of the letter and listings received from each of these agencies are included in Appendix E. Studies and field surveys were performed for all special-status species with potential to be present within the proposed Highway 101 project vicinity. Survey results for plants, wildlife and jurisdictional features are addressed in the NES, *BAs*, and *Habitat Quality Evaluation Report (HQE)* in detail. The discussion below focuses on the results of studies conducted for five special-status plant species; three fish species, the Russian River tule perch, coho salmon, and steelhead; two special-status amphibian species, the California Tiger Salamander (CTS) and California red-legged frog; two special-status reptile species, the western and northwestern pond turtle; and two special-status bird species, the white-tailed kite and loggerhead shrike, for which there is potentially suitable habitat in the project area.

#### Special-status Plant Species

The USFWS listing included five plant species. Three non-vernal pool plant species were identified as having potential to occur in the project area: Marsh microseris (*Microseris paludosa*), Sebastopol meadowfoam (*Limnanthes vinculans*), and North coast semaphore grass (*Pleuropogon hooverianus*), as described below. Preliminary botanical surveys resulted in negative findings for all three plants, and it is unlikely that these species exist within the project area.

**Marsh Microseris:** Marsh microseris is a perennial herb in the sunflower family (*Asteraceae*) with pinnately lobed leaves. The plant produces five or more yellow, rayed flowers that bloom between April and June. Marsh microseris habitat consists of closed-cone conifer forests, cismontane woodlands, and valley and foothill grasslands in several California counties, including Sonoma County. Historically, the marsh microseris occurred in eight California counties. The species is thought extirpated from two of those counties completely as well as extirpated from occurrences in other counties, and the CNPS lists it as a 1B rare species.

**Sebastopol Meadowfoam:** Sebastopol meadowfoam is a small, multi-stemmed annual herb found in the false mermaid family (*Limnanthaceae*). Leaves on the mature plant have three to five undivided narrow leaflets. Small, bell-shaped white flowers bloom in April and May. Sebastopol meadowfoam is associated with mesic meadows and seeps, moist valley foothills and grasslands, and vernal pools in Sonoma County. Historically, the species was known in Sonoma and Napa counties,

however, the Napa County population is thought extirpated. Most current occurrences of the species are found in the drainage of the Laguna de Santa Rosa on private land.

Sebastopol meadowfoam was listed by the state of California as endangered in 1979 and by the federal government in 1991. There is no critical habitat designated for the species and a vernal pool ecosystem recovery plan, which would include the species, is under development. Primary threats to Sebastopol meadowfoam are residential and commercial development, changes in hydrology, cattle grazing, and off road vehicle use.

**North Coast Semaphore Grass:** North coast semaphore grass is a large, succulent perennial in the grass family (*Poaceae*). The grass has long, flat ribbon-like leaves and a terminal unbranched spike or widely spaced spikelets. North Coast semaphore grass is found in broadleafed upland forest, North coast coniferous forest, and freshwater meadows and seeps. The species is known from approximately twelve populations in Marin, Sonoma, and Mendocino counties. Ten of these occurrences are thought extirpated, while two new populations have been found. North Coast semaphore grass was listed by the state of California as rare in 1979, and was upgraded in status to threatened in 2002. The main threats to North Coast semaphore grass are elimination of habitat and disruption of natural hydrology in the environment.

***Vernal Pool Plant Species:** Protocol-level presence/absence surveys were conducted during 2006 pursuant to the “1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may Affect Four Endangered Plant Species of the Santa Rosa Plain, California” (1998 Plant Programmatic Opinion) (Service 1998) and the Santa Rosa Plain Conservation Strategy. This protocol addresses four vernal pool plant species described in the following paragraph.*

Sebastopol meadowfoam is one of four federally-listed plants that occur in vernal pools and are subject to special habitat assessment requirements pursuant to the USACE HQE process for projects within the Santa Rosa Plain. The meadowfoam also occurs in mesic meadows and seeps, moist valley foothills and grasslands and thus is somewhat more widespread than the other listed species. The other three Santa Rosa Plain listed plants, Sonoma sunshine (*Blennosperma bakeri*), Burke’s goldfields (*Lasthenia burkei*) and many-flowered navarretia (*Navarretia leucocephala* ssp. *Plieantha*), occur only in vernal pools. Burke’s goldfields and Sonoma sunshine, in addition to the Sebastopol meadowfoam, have been identified as federally-listed plants that are known to occur within the USGS Cotati Quad. *The protocol-level surveys conducted during 2006 resulted in negative findings for all four vernal pool plant species and corroborate the negative findings for the other three listed plant species.*

### **Special-status Wildlife Species**

**Russian River Tule Perch:** The Russian River tule perch (*Hysterocarpus traski poma*) is currently confined to the Russian River and its tributaries in Sonoma and Mendocino counties. Russian river tule perch require clear, flowing water and abundant cover. Although they will feed in shallow waters, they generally require deep pools for refuge and feeding. They are also very sensitive to

stream pollution and tend to be absent from turbid, slow-moving water. The decline of Russian River tule perch in recent years has been attributed primarily to habitat alteration due to dams on the Russian River that have increased turbidity and decreased water quality. The Russian River tule perch is currently listed as a species of concern by both the federal government and the CDFG.

**Pacific Salmon and Trout: Steelhead, Chinook, and Coho Fisheries:** Pacific salmonids and trout are anadromous fish. Anadromous is defined as those fish species that move from sea (saltwater) to fresh water for reproduction. The life cycle of anadromous salmonids entails hatching in cool headwater tributaries of large river systems and moving out to saltwater as young fish. In the ocean they grow rapidly to adults. Upon reaching maturity they return to hatching streams to spawn, typically followed by death.

Successful spawning, incubation, and juvenile rearing require clean, coarse, well-oxygenated gravels free of fine sediments. Excessive accumulations of sediment fines reduce the hatching success of eggs and retard embryo and juvenile growth. Upon emerging from gravel, juveniles (fry) remain in cool, shaded, clean water with resting and escape habitat and ample invertebrates available for food through late summer and fall. Spawning and juvenile rearing usually occurs along upper reaches of smaller tributaries with suitable habitat. As fry reach the smolt phase, they migrate downstream, typically March through June annually.

Each of the salmonid species has genetically distinct populations (runs), termed evolutionarily significant units (ESU) associated with each major tributary. The ESU serves as an alternative definition for “distinct population segments” under the federal Endangered Species Act (NOAA Fisheries 2002a). Due to differing life history strategies, management considerations and conservation threats, each ESU is treated as a separate species.

Three salmonid species consisting of two ESUs of salmonid fisheries have suitable habitat in the Laguna de Santa Rosa, Willow Brook, and Copeland Creek within the project area: coho salmon (*Oncorhynchus kisutch*) - Central California Coast ESU; Chinook Salmon (*Oncorhynchus tshawytscha*) - California Coastal ESU, and steelhead (*Oncorhynchus mykiss*) - Central California Coast ESU, as described below.

**Coho Salmon:** The central California coast coho salmon is federally listed as threatened by the NOAA Fisheries and state listed as endangered by CDFG. Primary distribution of the coho salmon is the American and Sacramento rivers and other drainages northward from San Francisco Bay to Alaska. There are some minor coho runs documented for Santa Cruz County. Historically, coho salmon were never common in the Sacramento Valley or generally as far south as the Bay Area. Coho salmon have recently been recorded in tributaries of the Russian River. NOAA Fisheries has designated critical habitat for coho salmon in Copeland Creek and Laguna de Santa Rosa, including



the water, streambed, banks, and adjacent riparian zone<sup>6</sup>. Nonetheless, based upon communication with NOAA Fisheries and CDFG<sup>7</sup>, coho salmon are not known to occur in either of these streams.

**Chinook Salmon:** *The California Coastal Chinook salmon is federally listed as threatened by the NOAA Fisheries. Chinook are the largest Pacific Salmon and generally spawn in larger rivers and tributaries than do steelhead or coho. Chinook in the project area are fall-run, ocean-type, meaning that adults enter freshwater in the fall months, and the juveniles begin their downstream migration soon after. Adults enter the Russian River from August through January, and peak spawning activity in the main stem is in October and November. Out-migration of juveniles in the Russian River occurs from February through June of their first year. Thus, juveniles are generally absent from the area during summer and fall.*

*Although Chinook have spawned each year in the Russian River mainstem within the past several years (SCWA 2006), and a few adults have been observed in Santa Rosa Creek (Meritt, Smith Consulting, unpublished data), there are no records of this species in other Laguna de Santa Rosa tributaries, and the Laguna watershed is excluded from proposed/designated critical habitat for Chinook (NMFS 2005b). Mark West Creek and Laguna de Santa Rosa are excluded from critical habitat for Chinook. Willow Brook is not included in the Chinook Evolutionary Significant Unit (ESU).*

**Steelhead:** The central California coast steelhead is federally listed as threatened by the NOAA Fisheries. Steelhead are migratory trout, saltwater-tolerant, and may include resident (non-migratory), potamodromous (migratory within drainage up to estuarine waters only), or anadromous (migrate to open ocean) life histories. Regardless whether resident or migratory, adults return to hatching sites to spawn after one to three years. Unlike other Pacific salmon species, adults do not necessarily die after spawning; up to 20 percent of adults live to repeat the breeding cycle three or four times.

Central California coast steelhead spawning runs begin in late October and continue through May, with peak migration from mid-December through mid-April. Eggs hatch in about two to three weeks. Hatching young may remain at the hatch site or disperse immediately, but generally remain in headwaters for about one year before moving out to salt water. Spawning and juvenile rearing usually occurs along upper reaches of smaller tributaries with suitable habitat. As fry reach the older juvenile phase, they migrate downstream, typically during March through June.

Steelhead are known to occur in Copeland Creek, which flows into the Laguna de Santa Rosa. The Petaluma Creek watershed, which includes Willow Brook in the project area, has been designated as

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<sup>6</sup> NOAA Fisheries, May 5, 1999. Designated Critical Habitat; Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. Federal Register, Vol. 64, No. 86: 24049-24062.

<sup>7</sup> Personal communication between Merritt Smith Consulting (Michael Fawcett), NOAA Fisheries (Dan Logan) and CDFG (Bill Cox).

critical habitat for steelhead.<sup>8</sup> Although steelhead are present in the Lagunas de Santa Rosa and its tributaries, the watershed has been excluded from designation as critical habitat.

**California Tiger Salamander:** The California Tiger Salamander (CTS, *Ambystoma californiense*) is federally listed as threatened in the Santa Barbara, Sonoma, and Central California Distinct Population Segment (DPS) and state-listed as a ‘species of special concern’. A member of the family Ambystomatidae, the CTS is a large, terrestrial salamander with a broad, rounded snout. Coloration of the CTS varies, but in general, it is black above with large pale yellow to white spots along the sides. Adults reach a length of three to five inches. CTS are restricted to grasslands, oak savannah, and edges of mixed forest plant communities throughout their range. CTS use three distinct habitats during three different stages of their life cycle: breeding habitat, upland aestivation habitat, and movement or dispersal habitat.

*Critical habitat for CTS has not been designated; therefore, none will be adversely affected by the project.*

Habitat assessment and protocol-level drift fence and pitfall trap surveys were conducted during 2003 to determine the presence of California Tiger Salamander (CTS). *Subsequent to the surveys, the Santa Rosa Plain Conservation Strategy (Strategy) was published by the Santa Rosa Plain Conservation Strategy Team, which is made up of representatives of government agencies and interested parties. Consultation regarding impacts to CTS was conducted and compensation measures identified in accordance with the Strategy. See Section 3.15.3.4, Avoidance, Minimization, and/or Mitigation Measures.*

*A No-jeopardy Biological Opinion with compensation and minimization measures was issued on October 18, 2006, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).*

**California Red-legged Frog:** The California red-legged frog (CRLF), (*Rana aurora draytonii*) is federally listed as threatened and state listed as a ‘species of special concern’. The CRLF typically inhabits a variety of aquatic, upland, and riparian environments, including ephemeral and permanent ponds, seasonal wetlands, perennial creeks, intermittent streams, and human-made channelized drainages.

Two years of protocol-level surveys for CRLF were conducted in all potentially suitable habitat in the proposed project vicinity in accordance with the USFWS requirements as stated in “Guidance on Site Assessment and Field Surveys for California Red-legged Frogs” (1997).<sup>9</sup> These surveys identified no CRLF during either of the two survey seasons. The two years of negative survey findings, lack of known occurrences of CRLF within the Highway 101 corridor vicinity, and poor quality of potential

<sup>8</sup> NOAA Fisheries, September 2, 2005. Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionary Significant Units of Pacific Salmon (*Oncorhynchus tshawytscha*) and Steelhead (*O. mykiss*) in California; Final Rule. Federal Register Vol. 70, No. 170: 52487-52627.

habitat within the corridor support the conclusion that CRLF is not present within the highway corridor and would not be affected by construction of the proposed project.

**Western and Northwestern Pond Turtle:** The western pond turtle is identified as a species of special concern by CDFG. Under CEQA guidelines, the species must be considered in project planning regardless of formal listing as endangered or threatened.

The western pond turtle (*Clemmys marmorata*) historically occurred along the Pacific coast, principally west of the Cascade-Sierra Nevada-Penninsula Mountains, with the Central Valley hosting the highest densities. Decline of this species is attributed to conversion of native wetlands to urban and agricultural uses. Preferred habitat includes ponds, lakes or sloughs isolated from streamflow, but may include perennial streams and associated riparian habitats. A recent survey indicates that less than 15 percent of canal, stream, or river sites had western pond turtles, and less than 25 percent of all suitable, potential habitat contains pond turtles.

The northwestern pond turtle (*Clemmys marmorata marmorata*) is a subspecies of the western pond turtle that ranges from the Oregon-Washington border to central California, where it intergrades with the southwestern pond turtle (*Clemmys marmorata pallida*). Northwestern pond turtles inhabit a range of aquatic habitats with abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges. Due primarily to loss of aquatic habitat, this subspecies has declined through 75 to 80 percent of its historic range and is classified as a species of concern by both the USFWS and CDFG.

The nearest recorded occurrence of western pond turtle or its subspecies, the northwestern pond turtle, was in 1994 immediately north of the project area in Hinebaugh Creek at the Rohnert Park Expressway interchange. No suitable habitat occurs within the project vicinity, however, suitable habitat occurs outside the project vicinity, along the Laguna de Santa Rosa, downstream of Highway 101. It is unlikely that western or northwestern pond turtle are present in the project vicinity.

**White-tailed Kite:** The white-tailed kite (*Elanus leucurus*) was threatened with extinction in the early part of the twentieth century but has since recovered and is now found in virtually all California lowlands west of the Sierra Nevada. Although California currently holds the largest population of white-tailed kites in North America, the species is still considered rare and is listed as a federal species of concern during breeding season and afforded fully protected status by the CDFG.

White-tailed kites are most often found in areas surrounded by open habitat such as lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas. White-tailed kites breed and winter in low densities throughout central and into northern California. The CNDDDB has a record of one breeding pair approximately 18.5 km (11.1 m) northwest of the

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<sup>9</sup> USFWS recently released a *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Aug 2005), which changed the survey period and specifics of the survey protocol. This guidance was released after the field work was completed for the present project.

project limits, however, nesting and foraging habitat occurs along the Highway 101 corridor in several locations.

**Loggerhead Shrike:** The loggerhead shrike (*Lanius ludovicianus*) is a predatory songbird that is resident in the project area. It is identified as a species of concern for USFWS and a species of special concern by CDFG and is protected under the Migratory Bird Treaty Act. Under CEQA guidelines, rare species must be considered in project planning regardless of formal listing as endangered or threatened. The loggerhead shrike qualifies as it is considered rare, restricted in distribution, or declining throughout its California range according to CDFG.

Loggerhead shrikes prefer open habitat characterized by forbs and grasses interspersed with low shrubs, widely-spaced trees, and bare ground. Prairies, grasslands, pastures, fencerows or shelterbelts, mowed road rights-of-way, abandoned railroad rights-of-way, cemeteries, golf courses, open woodlands, farmsteads, and old orchards are examples of the types of habitats where loggerhead shrikes most commonly occur. Scattered shrubs or trees, particularly dense, thorny species, are typically used for nesting and hunting perches. As opportunistic predators, loggerhead shrikes feed on a wide variety of prey, including insects, small mammals and birds, reptiles, amphibians, and occasionally carrion.

Loggerhead shrikes are adaptable to urban environments and may occur anywhere along the Highway 101 corridor as long as preferred habitat characteristics and abundant prey supplies are present.

### 3.15.3.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new highway construction that would involve impacts to special-status plant and wildlife species. Impacts of the proposed project Build Alternative (*Preferred Alternative*) on special-status species are reported in the following paragraphs.

#### Special-status Plant Species

*Preliminary botanical surveys for vernal pool and other special-status plant species were conducted during 2003. Protocol-level presence/absence surveys for vernal pool plant species were conducted during 2006 to complete the HQE process as required pursuant to the “1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may Affect Four Endangered Plant Species of the Santa Rosa Plain, California” (1998 Plant Programmatic Opinion) (Service 1998) and the Santa Rosa Plain Conservation Strategy. These investigations indicated that vernal pool plant species do not exist within the immediate project area. Protocol-level presence/absence surveys for other special-status plant species were also conducted in 2006 with negative findings.*

*Formal consultation with the USFWS under Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) was initiated on October 26, 2004. Impacts to federally listed plant species including listed vernal pool plant species were evaluated pursuant to the Santa Rosa Plain*

*Conservation Strategy (December 2005) and the 1998 Programmatic Biological Opinion. The USFWS returned its No-jeopardy Biological Opinion with minimization and compensation measures for impacts to federally-listed and vernal pool plants on October 18, 2006; a copy is provided in Appendix E. Receipt of the Biological Opinion completes consultation requirements regarding these plant species.*

### **Special-status Wildlife Species**

**Russian River Tule Perch:** The proposed project would permanently affect up to 0.0076 ha (0.0187 ac) of aquatic habitat at the Laguna de Santa Rosa that provides suitable habitat for Russian River tule perch.

**Pacific Salmon and Trout: Coho Salmon, Chinook Salmon, and Steelhead:** The proposed project would permanently affect up to 0.0244 ha (0.0601 ac) of aquatic habitat at the Laguna de Santa Rosa, Willow Brook and Copeland Creek that provides suitable habitat for coho salmon, *Chinook salmon*, and steelhead. The habitat at the Laguna de Santa Rosa is the same habitat that would be suitable for Russian River tule perch as reported in the previous paragraph. The proposed roadway improvements could impact these sensitive species by direct take, *permanent loss of aquatic habitat displaced by new piers and additional direct shading.*

*Informal consultation was undertaken with NOAA Fisheries regarding potential impacts to designated critical habitat for coho salmon, Chinook salmon, and steelhead. NOAA Fisheries reviewed the NES and BA and in August 2007, returned a letter of concurrence that the project is not likely to affect these listed species. The CDFG will review the NES and BA and determine if the NOAA Fisheries' letter of concurrence is consistent with the California Fish and Game Code, as coho salmon is State listed as a threatened species in the region of the proposed project. Also, the Russian River tule perch is a State species of concern. The proposed project would have no effect on these Pacific salmon or trout.*

**California Tiger Salamander:** Formal consultation with the USFWS under Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) was initiated on October 26, 2004 regarding impacts of the proposed project on California tiger salamander. Consultation in accordance with the Santa Rosa Plain Conservation Strategy was completed in October, 2006. The USFWS reviewed the NES/BA and returned its No-jeopardy Biological Opinion identifying project conditions and measures to minimize harm to the species. The USFWS Biological Opinion was issued on October 18, 2006; A copy is provided in Appendix E. Receipt of the Biological Opinion completes consultation requirements regarding CTS. The CDFG will review the NES/BA and determine if the USFWS biological opinion and conditions and measures to minimize harm to the species are consistent with the California Fish and Game Code. It is also expected that CDFG's consistency determination will be received before the final environmental document would be approved. *The proposed project may affect but is not likely to adversely affect CTS.*

**California Red-legged Frog:** Negative protocol-level survey findings, lack of known occurrences of CRLF within the proposed project vicinity, and poor quality of potential habitat within the corridor

support the conclusion that CRLF is not present within the highway corridor and therefore would not be affected by construction of the proposed project.

**Western and Northwestern Pond Turtle:** The nearest recorded occurrence of western pond turtle or its subspecies the northwestern pond turtle was in 1994 immediately north of the project area in Hinebaugh Creek at the Rohnert Park Expressway interchange. No suitable habitat occurs within the project vicinity, however, suitable habitat occurs upstream and downstream of Highway 101, along Willow Brook, Laguna de Santa Rosa, and Copeland creeks. Direct impact to the species could occur if individual pond turtle(s) moved into the project vicinity during construction. Indirect impacts to the species could be caused by siltation downstream of project construction. Preconstruction mitigation measures and best management practices will be implemented as described in Section 3.16.13 to ensure no take of individuals of the species.

**White-tailed Kite, Loggerhead Shrike, and Migratory Birds:** White-tailed kites are most often found in areas surrounded by open habitat such as lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas. The California Natural Diversity Data Base (CNDDB) has a record of one breeding pair approximately 18.5 km northwest of the project limits, however, nesting and foraging habitat occurs along the Highway 101 corridor in several locations. Loggerhead shrikes and other migratory birds are adaptable to urban environments and may occur anywhere along the project corridor as long as preferred habitat characteristics and abundant prey supplies are present. Project construction and the conversion of previously undeveloped areas would cause the loss of potential habitat for white-tailed kite and loggerhead shrike as well as more common migratory birds that are protected by the Migratory Bird Treaty Act (MBTA). There is abundant alternative foraging and nesting habitat in the general area. Preconstruction mitigation measures will be implemented as described in Section 3.16.13 to ensure no take of individual nests, eggs, or young of the species.

### 3.15.3.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following avoidance, minimization, and mitigation measures *will* address the special-status species impacts identified in the foregoing section.

#### Special-status Plant Species

*Avoidance and mitigation measures were developed in consultation with USFWS pursuant to the Santa Rosa Conservation Strategy (December, 2005) and the 1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may Affect Four Endangered Plant Species of the Santa Rosa Plain, California (1998 Plant Programmatic Opinion) (Service 1998). Compensation for the loss of habitat for listed plants for this project is 0.30 ha (0.75 ac). Given the negative findings of the 2006 surveys, consultation with USFWS may be re-opened and this compensation may be reduced. To ensure no take of such plant species, additional plant surveys are also recommended prior to construction during the bloom period for each of the plant species.*

### Special-Status Wildlife Species

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding impacts to natural habitats in the project area that provide habitat for special-status wildlife species. Potential for presence and impacts to special-status wildlife species is limited primarily to three fish species and the California tiger salamander. Construction phase avoidance, minimization and/or mitigation measures are also described in Section 3.16.13.2 for special-status wildlife species that may enter project drainages.

**Russian River Tule Perch and Pacific Salmon and Trout: Coho Salmon, Chinook Salmon, and Steelhead:** Modifications at the Laguna de Santa Rosa, Willow Brook, and Copeland Creek crossings would be developed in consultation with NOAA Fisheries, and protective measures would be implemented to minimize incidental take of the species and to avoid jeopardizing the continued existence of the species. Riparian habitat will be restored at a mitigation ratio to be established in consultation with NOAA Fisheries, USFWS and CDFG.

*This restoration will occur, if possible, within the action area (i.e., an undefined distance upstream and downstream of the bridge sites). For permanent loss of the small amounts of aquatic habitat at each bridge site (0.0064 ha at Willow Brook, 0.0076 ha at Laguna de Santa Rosa, 0.0078 ha at Copeland) restoration/enhancement of stream banks and riparian areas emphasizing the features identified as essential to properly functioning condition of migration corridors for listed salmonids (natural cover such as submerged or overhanging wood, vegetation, boulders, side channels and undercut banks supporting juvenile and adult mobility and survival) will be emphasized. Any improvements with respect to such features over the existing conditions within the action area at the three crossing should more than compensate for the loss of habitat displaced by new structures.*

**California Tiger Salamander:** Consultation with USFWS to determine appropriate compensation measures for impacts to CTS areas was completed in accordance with the 2006 Santa Rosa Plain Conservation Strategy. Caltrans/SCTA will compensate for the loss of 12.19 ha (30.14 ac) of California tiger salamander habitat with the acquisition and preservation of 14.27 ha (35.30 ac) of habitat for the California tiger salamander. Compensation will be achieved by purchase of credits in a conservation bank approved by USFWS to sell CTS credits in Sonoma County and consistent with the methodology described in the Santa Rosa Plain Conservation Strategy. The site used for conservation must meet or exceed the minimum performance standards/suitability requirements set forth in the Biological Opinion issued on October 18, 2006; see Appendix E, Biological Opinion. Payments shall be made prior to groundbreaking for the present project. USFWS will be provided with the appropriate documents indicating that credits have been purchased, specifically including the amount of credits purchased based on the actual area affected by the proposed project.

### **3.15.4 Trees and Other Mature Vegetation**

#### **3.15.4.1 REGULATORY SETTING**

##### **California State Senate Concurrent Resolution No. 17**

California State Senate Concurrent Resolution No. 17 was filed with the Secretary of State on September 1, 1989. This resolution addresses the protection of native Valley/Coast live oak woodlands with respect to land use/transportation planning projects. The resolution specifically calls for State agencies to “preserve and protect native oak woodlands to the maximum extent feasible,” or “provide for replacement plantings where designated oak species are removed from oak woodlands.”

##### **California State Senate Bill 1334**

California State Senate Bill 1334 was filed with the Secretary of State on September 24, 2004. The bill outlines oak woodland mitigation options for counties to achieve feasible and proportional habitat mitigation under CEQA. If a county determines that a project within its jurisdiction may result in a significant effect to oak woodlands, the county shall require one or more mitigation alternatives as outlined in the bill to mitigate the effect of the conversion of oak woodlands.

##### **Sonoma County Tree Protection Ordinances**

The following Sonoma County ordinances apply to trees in County jurisdiction:

- The Sonoma County Tree Protection Ordinance No. 4044 establishes general provisions and construction standards to ensure that projects shall be designed to minimize the destruction of protected trees. Protected trees (greater than nine inches), their protected perimeters and whether they are to be retained or removed are to be clearly shown on all improvement plans. Applicants are required to comply with the conditions established in the Ordinance and are encouraged to use a qualified specialist to establish tree protection methods. The Ordinance also states that the Valley Oak (*Quercus lobata*) shall receive special consideration in the design review process to the extent that mature specimens shall be retained to the fullest extent feasible.
- The Sonoma County Valley Oak Ordinance No. 4991 defines Valley Oak sizes and mitigation options for removal of valley oaks. A written notice must be filed at least five days prior to removal.
- The Sonoma County Heritage Tree Ordinance No. 3651 provides for the identification and protection of designated heritage trees. The Ordinance requires approval and mitigation for removal of designated heritage trees.

#### **3.15.4.2 AFFECTED ENVIRONMENT**

Trees and other mature vegetation border the edge of Highway 101 at various locations throughout the project corridor. Mature trees in the corridor consist primarily of redwoods, with some Monterey Pines, eucalyptus, and oak trees. Consistent with the regulatory setting above, this section focuses on oak trees in the project vicinity. Existing redwood trees along Highway 101 are considered aesthetic resources because they are outside of their biological range, do not provide habitat, do not support



redwood populations, yet offer scenic amenity to the highway corridor. Therefore, redwood trees and other ornamental vegetation along the project corridor are discussed in Section 3.6, Visual/Aesthetics.

Existing trees within the project limits are grouped into two classifications:

- Mature trees, which have trunks greater than 25 cm (10 in) in diameter at breast height; and
- Trees of relatively small size, which have trunks from 10 cm to 25 cm (four to 10 in) in diameter at breast height.

#### **3.15.4.3 ENVIRONMENTAL CONSEQUENCES**

The No-Build Alternative would not result in construction that would affect trees in the Highway 101 corridor. The proposed project would require removal of *five to 56 mature valley oak trees*. No coast live oaks would be removed. Construction of the proposed project would not result in the conversion of oak woodlands.

#### **3.15.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

The project has been designed to use existing right-of-way to the greatest extent feasible in order to reduce impacts to mature trees in the project area. The majority of the widening occurs in the median of the roadway. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way and impacts to mature trees. Mature oak trees would be replaced *where feasible* within the project *limits and* right of way. Caltrans and their contractors would comply with Federal, State and Sonoma County quarantine regulations related to Sudden Oak Death (SOD) and the disposal and transport of vegetation debris. Caltrans would comply with the conditions established in the Sonoma County Tree Protection and Heritage Tree Ordinances prior to removal of any trees outside of the State right-of-way and within County jurisdiction. *Avoidance and minimization approaches as identified in Section 3.6.4 will be incorporated during final design to reduce tree loss below the upper end of the reported ranges.*

### **3.15.5 Invasive Species**

#### **3.15.5.1 REGULATORY SETTING**

On February 3, 1999, President Clinton signed Executive Order 13112, which directs the agencies of the executive branch of the federal government to work to prevent and control the introduction and spread of invasive species. Species that are likely to harm the environment, human health, or the economy are of particular concern. The executive order builds on the National Environmental Policy Act (NEPA) of 1969, the Federal Noxious Weed Act of 1974, and the Endangered Species Act of 1973 to prevent the introduction of invasive species; provide for their control; and take measures to minimize economic, ecological, and human health effects.

Invasive species, with respect to a particular ecosystem, are defined as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to the ecosystem and is likely to cause economic or environmental harm or harm to human health.

Under the executive order, a federal agency cannot authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless all reasonable measures to minimize risk of harm have been analyzed and considered. Complying with the executive order means that federal-aid and Federal Lands Highway Program funds cannot be used for construction, revegetation, or landscaping that purposely includes the use of known invasive plant species.

The executive order established a National Invasive Species Council, and until an approved national list of invasive plants is defined by the council, “known invasive plants” are defined as those listed on the official noxious weed list of the state in which the activity occurs.

The following discussion complies with Executive Order 13112.

#### **3.15.5.2 AFFECTED ENVIRONMENT**

Highway 101 between Old Redwood Highway and Rohnert Park Expressway consists of a four-lane freeway. Adjacent land use is primarily rural and agricultural, with single- and multi-family residential, commercial and industrial uses near the city centers. Vegetation is mostly ruderal/disturbed, non-native grassland, ornamental landscape planted with coast redwood, and agricultural planted with grapes; there are few remaining natural areas. A variety of waterways traverse the corridor, some in excavated ditches or culverts and others in natural-bottom channels or their natural watercourse. Soils in the project corridor are varied and reflect development from volcanic and mixed basic alluvium, marine sands, andesite, and valley clays.

#### **3.15.5.3 ENVIRONMENTAL CONSEQUENCES**

The Highway 101 corridor provides opportunities for the movement of invasive species through the landscape. Invasive plant and animal species can move on vehicles and in the loads they carry. Weed seed can be inadvertently introduced into the corridor during construction on equipment and through the use of mulch, imported soil or gravel, or sod. Some invasive plant species might be deliberately or inadvertently planted in erosion control, landscape, or wildflower projects. The Highway 101 corridor is adjacent to a variety of private lands. Many of these adjacent lands have weed problems, and the highway and local roadway rights-of-way provide corridors along which these noxious and exotic weeds can spread. Implementation of avoidance and minimization efforts, as described below, would ensure that the proposed project would not contribute to the spread of invasive species.

#### **3.15.5.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

To prevent or minimize any introduction or spread of invasive species in the project area, the following methods will be incorporated into the construction specifications:

- Using high pressure water blasting or steam cleaning methods, clean all earthmoving equipment of dirt, mud, and seed residue before initially entering the project area.
- Avoid any unnecessary disturbance of project areas known to be infested with noxious weeds.

- Minimize soil disturbance within right-of-way.
- If soil disturbance outside slope stake limits is necessary, keep disturbed area to a minimum, monitor and control disturbed areas and topsoil stockpiles for growth of weed species subject to control, and re-vegetate in accordance with the landscape plans or other project specifications when disturbance is no longer necessary.
- Control weeds with pre-emergent, selective and nonselective herbicides. Inspect and monitor erosion control and other disturbed soils throughout construction. Inspect and monitor landscaping/seeding during the vegetation re-establishment period.
- Include payment for equipment cleaning under bid item for mobilization.
- Construction contractor shall comply with Federal, State and Sonoma County quarantine regulations related to Sudden Oak Death (SOD) and the disposal and transport of vegetation debris.

To prevent or minimize any introduction or spread of invasive animal species in the project area, the construction specifications will require that the contractor adopt sanitation and exclusion methods for preventing spread of invasive species, such as the following:

- Restrict use of contaminated soils and fills,
- Require pest-free forage and mulch and weed-free sod,
- Wash construction equipment.

## **3.16 Construction Impacts**

### **3.16.1 Construction Stages, Schedule, and Work Hours**

To minimize disruption to the traveling public, it is anticipated that the Highway 101 HOV Lane Widening Project would be constructed in stages. The following paragraphs present a feasible and reasonable construction staging for the purposes of identifying construction phase impacts and appropriate mitigation measures. Specific construction staging requirements would be defined during the final design process and an actual construction staging plan would be developed by the contractor. It is anticipated that this project would take approximately two years to construct. The construction contract would be followed by a replacement planting contract that would require approximately six months to complete and would include a three-year plant establishment period.

Each construction stage would maintain two lanes of traffic in each direction on Highway 101. Bicycle and pedestrian access would generally be maintained throughout the construction period, except during critical construction operations requiring short-term closures for certain elements or for safety reasons.

Lane closures would be made only during non-peak travel periods. All closures would require advance approval by the Resident Engineer and would be allowed only during periods of low traffic. Such periods would be defined through traffic studies made during the design phase in support of the construction project.

Most of the work could be done during daylight hours, but some nighttime work would be necessary to permit temporary closures for tasks that could interfere with mainline traffic or create safety hazards. Examples of these tasks include placing and removing temporary construction barriers, erecting structure falsework over the mainline or an active cross street, demolishing existing structures, placing pre-cast bridge segments, or connecting or conforming ramps to the mainline or local streets.

A Transportation Management Plan (TMP) would be developed in conjunction with the local jurisdictions. The TMP would provide advance notice to motorists and transportation and emergency service providers of information on construction activities and durations, detours, and access issues during each stage of construction. The TMP would identify services to facilitate safe implementation, such as increased California Highway Patrol presence during critical construction operations, and increased Freeway Service Patrol during peak travel periods. It would also include a public information program to provide motorists with advance notice of information related to the construction activities and durations, temporary closures and detours.

Temporary nighttime lane closures and/or detours would be required for activities such as placing and removing temporary concrete barriers to separate construction work areas and traffic. Some short-term closures (closures of a few hours to a few days) of existing interchange ramps may be necessary during some construction activities such as constructing conforms between existing and new roadways, paving operations, and lane striping. Advance notice would be provided of ramp closures and traffic would be detoured to the adjacent interchanges for these periods. To maintain traffic on Highway 101 and local streets, construction activities requiring traffic lane or ramp closures would not be permitted at adjacent interchanges of Highway 101 at the same time.

Retaining walls would be constructed with the associated widening work in each stage and sound walls would be constructed as early in each stage as practicable to help mitigate construction noise. At some locations, sound walls would be located on top of retaining walls and could not be constructed until the retaining wall was in place.

The Highway 101/SR 116 Interchange–Option B, which would raise the mainline profile and reconstruct the interchange and structures, would require the most complex staging on the project. The interchange construction staging would be integrated with the mainline construction staging scenario, but would require additional steps to maintain ramp access during construction. The following table describes a possible construction sequence of the key construction elements at the Highway 101/SR 116 Interchange – Option B.

**Table 3.16-1: Possible Construction Staging and Traffic Handling for the Highway 101/SR 116 Interchange–Option B**

Construction Activity Sequence	Traffic Handling
<ul style="list-style-type: none"> <li>Construct relocated portion of Redwood Drive and Commerce Boulevard.</li> <li>Construct southbound auxiliary lane, shoulders, right lane of southbound off-ramp, and retaining wall and concrete barrier between Redwood Drive and mainline.</li> <li>Construct northbound off-ramp, and southbound on-ramp. Provide temporary connections to existing mainline.</li> <li>Construct SR 116 and Old Redwood Highway improvements.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain traffic on existing Redwood Drive and Commerce Boulevard. Lane closures, detours or one-way traffic control may be required on Redwood Drive and Commerce Boulevard</li> <li>Maintain traffic on existing ramps. Short term ramp closures and detours required to conform to existing roadways.</li> <li>Maintain traffic on existing SR 116 and Old Redwood Highway with detours and lane closures.</li> </ul>
<ul style="list-style-type: none"> <li>Construct median portion of new bridge and mainline.</li> </ul>	<ul style="list-style-type: none"> <li>Night time lane closures on mainline required to set up temporary barriers to separate traffic and construction areas.</li> </ul>
<ul style="list-style-type: none"> <li>Demolish existing southbound bridge.</li> <li>Construct southbound outside portion of structure, mainline between southbound ramps, and left lanes of southbound off-ramp.</li> </ul>	<ul style="list-style-type: none"> <li>Shift southbound mainline traffic to median. Use reduced lane widths during new structure construction in median. Maintain northbound mainline traffic on existing lanes.</li> <li>Open southbound off-ramp to traffic.</li> </ul>
<ul style="list-style-type: none"> <li>Demolish existing northbound bridge.</li> <li>Construct northbound outside portion of structure and mainline between northbound ramps.</li> <li>Construct realigned northbound on-ramp.</li> </ul>	<ul style="list-style-type: none"> <li>Move temporary barrier to separate directional traffic and then shift northbound traffic to median lanes used by southbound traffic in previous stage.</li> <li>Maintain traffic on existing ramp. Short term temporary ramp closure and detours required.</li> <li>Shift northbound traffic to new mainline roadway.</li> </ul>
<ul style="list-style-type: none"> <li>Construct median barrier.</li> </ul>	<ul style="list-style-type: none"> <li>All Highway 101 mainline lanes and ramps constructed and open to traffic.</li> </ul>

### 3.16.2 Traffic and Transportation/Pedestrian and Bicycle Facilities

#### 3.16.2.1 ENVIRONMENTAL CONSEQUENCES

This subsection discusses anticipated construction phase effects on traffic, pedestrian, and bicycle access. Section 3.16.1, Construction Stages, Schedule and Work Hours, discusses the conditions that might affect access during construction.

During the construction phase of the project, traffic in the vicinity of the Highway 101 interchanges or along the Highway 101 mainline in the project area could be disrupted by construction equipment and vehicles. Traffic on Highway 101 may also be affected by trucks hauling construction materials and debris. Each construction stage would maintain two lanes of traffic on Highway 101 in each direction and bicycle and pedestrian access would be maintained throughout the construction period, except during critical short-term construction operations requiring closure to perform construction or for safety reasons.

Some minor detours would be required on the ramps and connecting streets during such short-term closures. During construction of conforms of the ramps to the mainline, which would occur at night,

traffic would be detoured to the adjacent interchanges. It is anticipated that temporary night closures of SR 116 (under Option B only) and temporary day time closures of West Railroad Avenue would be required for safety reasons during demolition of the existing structures, during girder removal or placement, and during placement and removal of falsework for new structures. Temporary nighttime closures are also anticipated on West Sierra Avenue for falsework placement and removal associated with the structure widening.

Construction activities for the project are not expected to have substantial impact on the availability of parking. Impacts to non-motorized traffic would be similar to those affecting motorized traffic. Bicycles and pedestrians are prohibited on the Highway 101 right-of-way, but all detours of roadways that permit these modes of travel would include provisions for maintaining pedestrian and bicycle access during construction. Ramps meeting ADA requirements would be installed in sidewalks at all crosswalks affected by the project.

### **3.16.2.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES**

Construction staging plans would be developed to minimize impacts to existing roadways. Contractors would be required to coordinate activities with commute schedules to minimize impacts to highway traffic in the corridor. Closure of one or more lanes for construction activities will be limited to late night and weekend hours when traffic is at a minimum.

The project TMP would include a public information program to provide motorists and transportation and emergency service providers with information related to construction activities and durations, temporary closures and detours. The SCTA would coordinate with Caltrans and the local jurisdictions to provide the public with advance notice of any proposed traffic detours and their duration.

Construction crews would follow established safety practices, including using flaggers, to protect work crews in the construction zone. Provisions would be incorporated into the construction contracts to designate areas for construction worker parking and to avoid parking impacts to residential or business areas.

Construction haul routes would utilize Highway 101 during non-peak hours to the greatest extent practicable to avoid traffic impacts to residential or business areas.

### **3.16.3 Farmlands/Agricultural Lands**

Construction activities for the project area would have temporary effects on two parcels of agricultural land within the project area. A temporary construction easement of approximately 0.11 ha (0.27 ac) would be required north of Willow Brook, along the west side of Highway 101. A 400-mm (15.75-in) PG&E gas line would be relocated within a 0.28-ha (0.68-ac) easement south of Pepper Road along the west side of Highway 101. No substantial adverse effects are anticipated, and therefore, no mitigation is necessary beyond Best Management Practices.

### 3.16.4 Community Impacts

Construction of the proposed project would involve temporary short-term street closures or detours in the vicinity of the project. These are expected to have little or no effect on the ability of community members to access public services and facilities in the area. The primary effect would be the need for emergency vehicles to observe any short-term road closures and temporary construction detours. A TMP would be developed by the construction contractor to address maintenance of traffic and emergency services delivery during construction. One element of the TMP would be to provide advance notice of and coordinate with emergency service providers regarding such short-term closures and detours. Construction-phase detours and road closures and the TMP are described in Section 3.16.2, Transportation and Traffic/Pedestrian and Bicycle Facilities.

A temporary construction easement of approximately 1,010 m<sup>2</sup> (10,872 ft<sup>2</sup>) would be required during construction of noise walls between West Sierra Avenue and Gravenstein Highway, temporarily affecting residential properties along the east side of Highway 101. A temporary easement of 260 m<sup>2</sup> (2,800 ft<sup>2</sup>) would also be required to accommodate construction of these noise walls at the Saint Joseph Catholic Church. During construction of noise walls at the south end of the Leisure Lake Mobile Home Park, a temporary easement of approximately 60m<sup>2</sup> (646 ft.<sup>2</sup>) would be required. No substantial adverse effects are anticipated, and therefore no mitigation is necessary beyond Best Management Practices. As described in Section 3.16.6, Visual/Aesthetics, the construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. Dust control during construction is discussed in Section 3.16.11, Air Quality. Noise control measures relating to the construction of the proposed project are discussed in Section 3.16.12, Noise.

### 3.16.5 Utilities/Service Systems

It is anticipated that utility relocation work would be performed in advance of the Highway 101 HOV lane widening work. In addition, some utilities may require protection in place during construction of the roadway improvements. Caltrans would coordinate with all utility providers during the preliminary engineering and design phases of the project so that effective design treatments and construction procedures are incorporated to avoid adverse impacts to existing utilities and traffic during construction. Nonetheless, the potential exists for construction activities to encounter unexpected utilities within the area of roadway improvements. In addition, utility relocations may require short-term, limited interruptions of service. No interference to existing utility services is anticipated during the realignment of the overhead power transmission lines because PG&E would put customer loads on alternate lines until the connections are re-established.

If unexpected underground utilities are encountered, the construction contractor would coordinate with the utility provider to develop plans to address the utility conflict, protect the utility if needed, and limit service interruptions. Any short-term, limited service interruptions of known utilities would be scheduled well in advance and appropriate notification provided to users.

Caltrans would also coordinate with emergency service providers, and through the public information program, to avoid emergency service delays by ensuring that all providers are aware (well in advance) of road closures or detours.

### **3.16.6 Visual/Aesthetics**

All construction activities for the project would involve the use of a variety of construction equipment, stockpiling of soils and materials, and other visual signs of construction. While construction activity would be evident to corridor residents and employees/employers at businesses in the project area, these visual changes would be short-term. The construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. Avoidance and minimization measures to protect mature trees and other vegetation are listed below.

- In areas where maximum protection of vegetation is desirable, clearing and grubbing is to occur only within excavation and embankment slope limits.
- Existing vegetation outside of clearing and grubbing limits shall be protected from the contractor's operations, equipment and materials storage.
- Tree trimming by the contractor shall be limited to that required in order to provide a clear work area.
- High visibility protective fencing shall be placed around trees prior to the commencement of roadway construction.
- Existing trees to be removed shall be field marked by the Engineer and approved by the Engineer prior to removal.
- Wherever feasible, slope lines will be adjusted to avoid tree removal.

No substantial adverse impacts are anticipated, and therefore, no mitigation is necessary beyond Best Management Practices. Dust control during construction is discussed in Section 3.16.11, Air Quality.

### **3.16.7 Cultural Resources**

#### **3.16.7.1 ARCHAEOLOGICAL IMPACTS**

As described in Section 3.7, Cultural Resources, a systematic and thorough program of subsurface investigation has been conducted in addition to secondary research to identify buried cultural resources. As a result of these efforts, it is not anticipated that construction activities would disturb buried cultural materials. In the unlikely event that buried cultural resources are inadvertently discovered during any ground-disturbing activities, Caltrans and FHWA would comply with 36 CFR 800.13 regarding late discoveries.

#### **3.16.7.2 HISTORIC ARCHITECTURAL IMPACTS**

No construction-phase adverse impacts to historic architectural resources are anticipated. There are no eligible historic resources in the project vicinity that could be affected by construction activities.



### **3.16.8 Hydrology and Floodplains**

#### **3.16.8.1 IMPACTS**

The proposed project crosses Copeland Creek, Laguna de Santa Rosa, and Willow Brook. Construction associated with waterway crossings could cause temporary changes in water volume or flow and increased siltation, sedimentation, erosion, and water turbidity from bankside activities and construction access.

#### **3.16.8.2 MITIGATION**

A Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented, in accordance with Section 402 of the federal Clean Water Act, as amended. One purpose of the SWPPP is to identify areas of concern related to construction within or close to major waterways. As part of the requirements for the SWPPP, best management practices (BMPs) would be identified to be used during construction to minimize the effect of construction activities on waterways. Recommended construction-period BMPs include:

- Scheduling construction during the non-rainy season.
- Monitoring the forecast for rainfall; adjusting the construction schedule to allow implementation of soil stabilization and sediment treatment controls before the onset of rain.
- For stream crossings, minimizing disturbance by selecting the narrowest crossing, avoiding steep and unstable banks or highly erodible soils, selecting equipment that reduces the amount of pressure exerted on the ground (e.g. using wide or high flotation tires, dual tires, tracked machines, etc), and using overhead or aerial access for transporting equipment across streams whenever possible.
- Limiting temporary stream crossings to culverts or bridges if the stream crossing remains during the rainy season.
- For pumped diversion of in-stream flows, continuously monitoring pumps and incorporating a standby pump. Employing velocity dissipation at the outlet as necessary to control erosion.
- Sizing diversion channels and/or culverts to accommodate a minimum 10-year storm event if placed within the channel during the rainy season.
- Isolating work areas within the waterway from the flow using sheet piling, k-rails, rip rap berms, or other methods of isolation.
- Keeping equipment used in a waterway leak-free.
- Stabilizing waterway embankments where necessary using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, etc.
- Protecting all drainage systems (culvert entrances, inlets, etc) from debris and sediment laden waters.
- If in-channel disturbance of fines (sand and silt sized particles) occurs, washing the fines (using water from a water truck or hydrant) back into the interstitial spaces of the existing gravel and cobbles.

### **3.16.9 Water Quality and Stormwater Run-off**

#### **3.16.9.1 IMPACTS**

The proposed project will involve construction over streams and channels, including Copeland Creek, Laguna de Santa Rosa, and Willow Brook. Construction will involve demolition of structures, cut and fill earthwork, asphalt paving, lengthening of culverts, bridge construction, retaining wall construction, site clearing, and landscaping. Each of these construction activities can have deleterious effects on the surrounding watershed and streams if stormwater and non-stormwater pollution controls are not in place during the time of construction. Another construction-phase impact is the discharge of construction-related pollutants, including pollutants from stormwater and non-stormwater discharges.

#### **3.16.9.2 MITIGATION**

The contractor would prepare a SWPPP to identify construction-period BMPs to reduce water quality impacts. The SWPPP would emphasize: 1) standard temporary erosion control measures to reduce sedimentation and turbidity of surface run-off from disturbed areas, 2) personnel training, 3) scheduling and implementation of BMPs throughout the various construction phases and during various seasons, 4) identification of BMPs for non-stormwater discharge such as fuel spills, and 5) mitigation and monitoring throughout the construction period. The plan will be submitted to Caltrans and the Regional Water Quality Control Board.

During construction, erosion control procedures would be used such as the placement of mulch on all disturbed areas, fiber rolls along slopes, silt fences at the boundaries of the construction site, stabilized construction entrances and exits equipped with tire washing capability, and check dams placed strategically to reduce flow velocity and to filter flows in defined drainage-ways. Due to the project's proximity to the Laguna Santa Rosa Creek, the only sediment impaired 303(d) listed body of water that crosses the alignment, a sampling analysis program for sediment will be implemented during construction to prevent sediment from flowing into this water body during construction activities.

Construction over and adjacent to waterways would include special construction BMPs to minimize the debris deposition into those waterways, as follows:

- Demolition and construction over and adjacent to waterways would be accomplished using non-shattering methods that would not scatter debris (for example, wrecking balls would not be acceptable).
- Platforms would be placed under/adjacent to bridges over waterways to collect debris.
- Watertight curbs or toe-boards on bridges over waterways would be provided to contain spills and prevent materials, tools, and debris from falling from the bridge.
- Materials adjacent to waterways would be secured to prevent discharges via wind.
- Attachments would be placed on construction equipment such as backhoes to catch debris from small demolition operations.

- Accumulated debris and waste from demolition would be stockpiled away from the waterway.
- Work areas within the waterway would be isolated from the flow using sheet piling, k-rails, rip rap berms, or other methods.
- Drip pans would be used during equipment operation, maintenance, cleaning, fueling and storage for spill prevention. Drip pans would be placed under all vehicles and equipment placed on bridges when expected to be idle for more than 1 hour.
- Equipment would be kept in a leak-free waterway.
- Waterway embankments would be stabilized, using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, and other stabilization methods, as necessary.
- All drainage systems (such as culvert entrances and inlets) would be protected from debris and sediment laden waters.
- Logs of all storm and spill events would be kept.

### **3.16.10 Hazardous Wastes/Materials**

#### **3.16.10.1 IMPACTS**

Two principal types of hazardous wastes or materials may cause impacts during construction: hazardous materials used during the construction process and hazardous wastes that may be generated during construction. Section 3.11, Hazardous Waste/Materials, discusses the potential for encountering pre-existing hazardous wastes within the project area and identifies appropriate mitigation measures.

Some hazardous materials, including fuels and motor oils, paints, cleaners, degreasers, and insulating materials, would be used during construction. While many of these materials are commonly used, they are considered hazardous materials (fuels, for example, are flammable) based on their physical properties, and improper handling could endanger workers and the public or result in contamination of soil and/or water.

The degree of hazard associated with these impacts on human or environmental receptors would depend upon the chemical properties, concentrations, or volumes of contaminants; the nature and duration of construction activities; and contaminant migration pathways. The largest potential exposure risk is to the construction workers.

#### **3.16.10.2 MITIGATION**

An approved worker health and safety plan (WH&SP) would address any hazardous materials handling during construction activities pursuant to Title 8 of the California Code of Regulations regarding workers' safety and the use of protective equipment during excavation, moving, or handling of contaminated soil or water. The WH&SP would establish measures to avoid or minimize potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan also would address avoidance and minimization of worker and environmental exposure to contaminant migration via surface water run-off pathways by implementation of comprehensive measures to control drainage from excavations. In addition, the

WH&SP would address handling, storage, and disposal of any hazardous materials used in the construction process. Since construction workers are in the closest proximity to potential hazards, a plan that avoids impacts to construction workers would provide adequate protection for surrounding residents, workers, and the traveling public.

### 3.16.11 Air Quality

#### 3.16.11.1 IMPACTS

The BAAQMD's approach to the analysis of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. PM<sub>10</sub>, which is primarily emitted from earthmoving activities, is the pollutant of greatest concern with respect to construction activities. Under appropriate construction controls, air pollutant emissions *impacts* for construction activities *would be minimized*.

Construction of the Build Alternative would consist of six phases over approximately two years, from 2009 to 2011: 1) clearing and grubbing; 2) earthwork; 3) construction of structures; 4) construction of retaining walls and sound walls; 5) paving; and 6) finishing. Pollutant emissions would be generated from the following construction activities:

1. Clearing and grubbing,
2. Grading and excavation,
3. Mobile emissions related to construction worker travel to and from project sites,
4. Mobile emissions related to the delivery and hauling of construction supplies and debris to and from project sites, and
5. Fuel combustion by on-site construction equipment.

The South Coast Air Quality Management District's (SCAQMD) construction emission calculation formulas were used to estimate construction emissions. Table 3.16.11-1, Construction Emissions, shows the estimated emissions associated with each phase of construction.

<b>Table 3.16.11-1: Construction Emissions</b>					
Construction Phase	Pounds per Day				
	CO	ROG	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
1. Clearing & Grubbing	28	8	98	16	64
2. Earthwork	33	9	110	19	88
3. Structures	46	11	134	24	55
4. Retaining Walls & Soundwalls	36	9	106	19	53
5. Paving	32	8	103	17	83
6. Finishing	18	5	67	11	18
Source: Terry A. Hayes Associates LLC, 2005.					

### **3.16.11.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

Control measures, such as the following, would be implemented to minimize construction emissions:

- All active construction areas shall be watered at least twice daily.
- All trucks hauling soil, sand, and other loose materials shall be covered and shall maintain at least two feet of freeboard.
- All unpaved access roads, parking areas, and staging areas at the construction site shall be watered at least three times daily or shall be applied with non-toxic soil stabilizers.
- All paved access roads, parking areas, and staging areas at the construction site shall be swept daily with water sweepers.
- Streets shall be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas that are inactive for ten days or more).
- Exposed stockpiles of dirt, sand, or debris shall be enclosed, covered, watered at least twice daily, or applied with non-toxic soil binders.
- Traffic speeds on unpaved roads shall be limited to 15 miles per hour.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways.
- Operations on any unpaved surfaces shall be suspended during “Spare the Air” days.
- Vegetation in disturbed areas shall be replanted as quickly as possible.
- Tires or tracks of all trucks and equipment leaving the site shall be washed.
- Excavation and grading activities shall be suspended when winds exceed 25 miles per hour.
- Diesel particulate filters and other suitable controls shall be used to reduce emissions of diesel particulate matter and other air pollutants.
- Visible emissions from all heavy duty off-road diesel equipment shall not exceed 20 percent opacity for more than three minutes in any hour of operation.
- Construction-related trips of workers and equipment, including trucks and heavy equipment, shall be minimized. An activity schedule shall be designed to minimize traffic congestion around the construction site.
- Construction equipment shall be model 1996 or newer. Fuel shall be low sulfur.
- Periodic, unscheduled inspections shall be employed to ensure that construction equipment is properly maintained at all times, tuned to manufacturer’s specifications, and not modified to increase horsepower, except in accord with established specifications.
- A construction schedule shall be specified to minimize cumulative impacts from multiple development and construction projects in the area.
- Construction equipment and staging zones shall be located away from sensitive receptors such as children and the elderly, as well as away from fresh air intakes to buildings and air conditioners. Equipment idling shall be minimized.
- Construction equipment shall use cool exhaust gas recirculation.

Table 3.16.11-2 displays construction emissions for the proposed project with these mitigation measures. CO, *Reactive organic gases* (ROG), NO<sub>x</sub>, and PM<sub>10</sub> emissions would be significantly reduced. SO<sub>x</sub> emissions would remain unchanged. These mitigation measures would ensure that impacts are not substantially adverse during construction of the project.

<b>Table 3.16.11-2: Construction Emissions With Mitigation</b>					
<b>Construction Phase</b>	<b>Pounds per Day</b>				
	<b>CO</b>	<b>ROG</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Clearing & Grubbing	4	1	59	16	30
Earthwork	4	1	66	19	41
Structures	5	1	81	24	25
Retaining Walls & Soundwalls	4	1	63	19	25
Paving	4	1	62	17	39
Finishing	3	1	40	11	8
Source: Terry A. Hayes Associates LLC, 2005.					

### 3.16.12 Noise

Noise at the construction sites would be intermittent and varying in intensity. The degree of construction noise may vary at different areas of the project site and also depending on the types of construction activities.

#### 3.16.12.1 REGULATORY SETTING

During the construction period, contractors would be required to comply with the noise ordinances of the cities of Petaluma, Cotati, and Rohnert Park:

City of Petaluma – Noise produced from construction equipment shall not occur before 7:00 a.m. nor after 10:00 p.m. any day of the week. In addition, noise producing activities shall not begin before 9:00 a.m. on Saturdays, Sundays and recognized Holidays. An application can be filed with the City of Petaluma Planning Director's office to obtain a conditional permit for exemption during these hours. In addition to the hours and days of restriction, the maximum noise levels are not to exceed a limit that ranges from 60 to 80 dBA, depending on the cumulative duration of noise levels (Petaluma 1997).

City of Cotati – The City requires construction activities of any sort (other than those performed on a single parcel of land by its owner or tenant) to be performed between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. to 6:00 p.m. Saturdays (Cotati 2004).

City of Rohnert Park – Construction projects that are within 500 feet of a residentially zoned property shall not produce noise that is annoying or discomforting to a reasonable person of normal sensitivity between 6:00 p.m. and 8:00 a.m. the next day, unless a permit has been obtained beforehand. In addition to the hours and days of restriction, the noise level at any residential property is not to exceed

60 dBA during daytime hours (7:00 a.m. and 7:00 p.m.) and is not to exceed 50 dBA or the measured ambient level during nighttime hours (7:00 p.m. and 7:00 a.m.) However, the City's regulations allow daytime noise to exceed the limits up to 65 dBA for a cumulative period of not more than five minutes during any one hour, and up to 70 dBA for a cumulative period of not more than one minute during any one hour (Rohnert Park 2004a and Rohnert Park 2004b).

#### **3.16.12.2 IMPACTS**

Long-duration construction noise exposures are difficult to quantify due to the intermittent nature of construction noise. Highway construction is accomplished in several different phases. Table 3.16.12-1 lists the calculated noise level for typical construction activities that could be expected in the project area.

#### **3.16.12.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES**

The following control measures would be implemented to minimize noise disturbances at sensitive receptors during construction:

##### **Equipment Noise Control**

- Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators intact and operational. All construction equipment would be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.) (Caltrans, 1999).
- Turn off idling equipment.

Table 3.16.12-1: Construction Operation Noise Levels

No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA <sup>1</sup>	Hourly Equivalent Noise Levels at 30 m, dBA <sup>1</sup>	No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA <sup>1</sup>	Hourly Equivalent Noise Levels at 30 m, dBA <sup>1</sup>
<b>Clear and Grub</b>					<b>Earthwork</b>				
1	Excavator	83	80	74	1	Excavator	83	80	74
1	Backhoe	75	72	66	1	Backhoe	75	72	66
4	Heavy Duty Dump Trucks	77	74	68	1	Front Loader	74	71	65
	Overall L <sub>eq</sub> (h)		84	78	1	Dozer	85	82	76
<b>Bridge Demolition</b>					1	Trencher	80	77	71
1	Backhoe	75	72	66	4	Heavy Duty Dump Trucks	77	74	68
1	Excavator	83	80	74		Overall L <sub>eq</sub> (h)		87	81
4	Heavy Duty Dump Trucks	82	79	73	<b>Structures</b>				
	Overall L <sub>eq</sub> (h)		87	81	1	Excavator	83	80	74
<b>Retaining Walls</b>					1	Backhoe	75	72	66
1	Backhoe	75	72	66	1	Bormag BMP 851	80	77	71
1	Bormag BMP 851	80	77	71	1	Crane	85	82	76
1	Concrete Pump	81	78	72	1	Concrete Pump	81	78	72
1	Compressor	68	65	59	1	Compressor	68	65	59
3	Ready Mix Trucks	81	78	72	1	Bridge Deck Paver	77	74	68
4	Medium Duty Dump Trucks	77	74	68	2	Flatbed Truck	75	72	66
2	Flatbed Truck	75	72	66	1	Pile Driver	80	77	71
	Overall L <sub>eq</sub> (h)		87	81	4	Medium duty Dump Trucks	77	74	68
<b>Paving</b>					3	Ready Mix Trucks	81	78	72
1	Grader	75	72	66		Overall L <sub>eq</sub> (h)		89	83
1	Water Truck	77	74	68	<b>Miscellaneous</b>				
1	Vibratory Roller	78	75	69	1	Loaders	74	71	65
1	Compactor	76	73	67	1	Dozer	85	82	76
1	Concrete Pump	81	78	72	2	Medium duty Dump Trucks	77	74	68
3	Ready Mix Trucks	81	78	72		Overall L <sub>eq</sub> (h)		84	78
1	Asphalt Paver	79	76	70	Notes: Calculated construction noise levels assume that all equipment operates for six hours out of an eight-hour day. Calculations also assume that all equipment is operated at full load 70 % of the time.				
1	Asphalt Roller	78	75	69					
1	Sweeper	79	76	70					
4	Medium Duty Dump Trucks	77	74	68					
2	Flatbed Truck	75	72	66	1. Predicted noise levels are from the center of the construction activity.				
	Overall L <sub>eq</sub> (h)		88	82					

Source: Parsons, 2005



## Administrative Measures

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times of least sensitivity for receptors.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to unavoidable construction noise. Provide frequent activity updates of all construction activities.

Application of the mitigation measures will reduce construction noise at the sensitive receptors; however, a temporary increase in noise would likely occur.

## 3.16.13 Biological Resources

### 3.16.13.1 IMPACTS

This section focuses on the short-term, temporary impacts of constructing the Build Alternative on biological resources in the project vicinity. Permanent impacts and mitigation measures are addressed in Section 3.15, Biological Environment.

## Natural Communities

Temporary effects on natural communities that would result from the Build Alternative (*Preferred Alternative*) are shown in Table 3.16.13-1, below.

Table 3.16.13-1: Temporary Impacts to Natural Communities for the Build Alternative (hectares/acres)	
Affected Natural Communities	Area of Impact
Ruderal/Disturbed	26.3 ha/65.75 ac
Non-native Grassland	0.71 ha/1.75 ac
Seasonal/Freshwater Emergent Wetland/Open Water	0.160 ha/0.395 ac
Willow Riparian	0.04 ha/0.11 ac
Coyote Brush Scrub	0.21 ha/0.52 ac

## Wetlands and Other Waters of the United States

The *Preferred Alternative* has the potential to temporarily affect up to 0.146 ha/0.361 ac) of jurisdictional wetlands and 0.014 ha/0.034 ac of other waters of the U.S.—or 0.160 ha/0.395 ac total wetlands/waters with Option B, the preferred SR 116 Interchange option. Avoidance and minimization measures are proposed in Section 3.16.13.2.

## Threatened and Endangered Species

As described in Section 3.15, Biological Environment, suitable habitat for four special-status fish species, coho salmon, *Chinook salmon*, steelhead, and Russian River tule perch, occurs in the project at the Laguna de Santa Rosa, *Willow Brook*, and Copeland Creek. Avoidance and minimization measures, including best management practices (BMPs), are proposed to avoid incidental take of

individuals, minimize impacts to their habitat, and prevent degradation of upstream waters (See Section 3.16.13.2, below).

Areas with potential to contain California Tiger Salamander (CTS) occur along Highway 101 within the project limits. Avoidance and minimization measures, including pre-construction surveys, are proposed to avoid incidental take of CTS and minimize impacts to CTS habitat (See Section 3.16.13.2, below). Habitat assessment and two years of negative findings protocol-level California red-legged frog (CRLF) surveys support the conclusion that CRLF are not present in the project vicinity. Avoidance and minimization measures are proposed, however, to prevent impact to CRLF that may enter drainages. No suitable habitat for western and northwestern pond turtles occurs within the project vicinity, however, suitable habitat occurs upstream and downstream of Highway 101, along Willow Brook, Laguna de Santa Rosa, and Copeland creeks. Biological monitoring for western and northwestern pond turtles during construction is recommended. If project activities cannot avoid the breeding bird season, preconstruction surveys are proposed for white-tailed kite and loggerhead shrike, as well as other migratory bird species.

No special-status plants were identified in the project vicinity during preliminary field studies *and protocol-level presence/absence surveys*. It is not anticipated that special-status plants would occur in the project vicinity at the time of construction. Pre-construction surveys *during the bloom period* are also recommended for these plant species to ensure no harm to the species during construction.

### **3.16.13.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES**

Construction phase impacts would be avoided or minimized by using *methods outlined in the Biological Opinion*, Caltrans standard specifications, *informal consultation with NOAA Fisheries*, and BMPs that have been established for construction of State highway facilities (Caltrans 1995). Procedures are identified with respect to individual biological resource issues in the following paragraphs.

*The following terms and conditions would be included in the project specifications and special provisions:*

- *The resident engineer (RE) shall maintain a copy of the Biological Opinion onsite whenever construction is taking place. The name and telephone number of the RE shall be provided to USFWS at least 30 calendar days prior to groundbreaking for the project.*
- *All project-related vehicle traffic shall be restricted to established roads and other designated areas.*
- *Project-related vehicles shall observe a 15 mile/hour (24 kilometer/hour) speed limit within project areas, except on County roads, and State and Federal highways. To the maximum extent possible, night-time construction will be minimized. Off-road traffic outside the designated project areas shall be prohibited.*
- *All equipment will be maintained such that there will be no leaks of fluids such as gasoline, oils, or solvents.*
- *The construction area shall be delineated with highly visible temporary fencing at least four feet (1.2 meters) in height, flagging, or other barrier to prevent encroachment of construction*

*personnel and equipment onto any sensitive areas during project work activities. Such fencing shall be inspected and maintained daily until completion of the project.*

- *All food-related trash items must be disposed of in closed containers and removed at least once every day from the entire project site.*

## **Natural Communities**

**Willow Riparian Scrub.** Avoidance measures will be implemented to minimize construction-phase effects on willow riparian scrub. Measures would include identifying, marking, and protecting trees with protective orange fencing to avoid disturbance or accidental intrusion by workers or equipment.

## **Wetlands and Other Waters of the U.S.**

The following avoidance measures would be included in the project specifications and special provisions:

- Construction within wetlands and drainages would be avoided during the rainy season to prevent excessive siltation and sedimentation;
- Materials and fluids generated by construction activities would be placed at least 30 meters (100 feet) from wetland areas or drainages until they could be disposed of in accordance with applicable regulations; and
- All natural communities and wetland areas located outside of the construction zone that could be affected by construction activities would be temporarily fenced off and designated as Environmentally Sensitive Areas (ESAs) to prevent accidental intrusion by workers and equipment.

Wetland habitats that are temporarily lost or disturbed due to project construction would be restored on-site to preconstruction conditions. Revegetation would be with native species such as cattails (*Typha* spp.), *Juncus* spp., or *Cyperus* spp. Any revegetation would be carried out by a contractor qualified in habitat restoration.

## **Special-Status Wildlife Species**

**Russian River Tule Perch:** Avoidance and minimization measures, as described above for coho salmon, *Chinook salmon*, and steelhead, would be sufficient to protect Russian River tule perch.

**Western and Northwestern Pond Turtle:** Avoidance and minimization efforts, including preconstruction surveys, would be implemented to avoid construction-related impacts to western and northwestern pond turtle, as described below.

- BMPs would be implemented during all phases of construction.
- The construction contractor shall furnish a biologist qualified to survey for western and northwestern pond turtles.
- Twenty-four hours prior to construction activities, the project areas would be surveyed by the qualified biologist for western and northwestern pond turtle. Surveys of the project area would be repeated if a lapse in construction activity of two weeks or greater should occur.

- A Worker Environmental Awareness Program would be conducted *by the contractor* to provide construction personnel with information on their responsibilities with regard to the western and northwestern pond turtle.
- A permitted biological monitor shall be on-call and capable of responding to the work site within one hour.
- If individual western or northwestern pond turtles are encountered, they would be moved immediately to a site that is a minimum of 100 m (330 ft) from the construction area boundary. The relocation site would be determined prior to commencement of construction activities.
- If western or northwestern pond turtles are encountered during construction, all activities shall cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.

#### **White-tailed Kite, Loggerhead Shrike and Other Migratory Birds.**

- If project activities cannot avoid the bird breeding season (generally February 1 – August 31), focused pre-construction breeding surveys will be conducted for white-tailed kite and loggerhead shrike, as well as other species protected under the MBTA.
- Surveys shall be conducted in all areas that may provide suitable nesting habitat by a suitably qualified ornithologist to be furnished by the contractor.
- Surveys would include areas within 1,640 m (500 ft) of the construction area that provide potential nesting habitat (access permitting).
- No more than two weeks before construction, a survey for nesting would be conducted by a qualified ornithologist.
- If nesting birds are identified, occupied nests would not be disturbed during the nesting season (February 1 through August 31 for raptors; March 1 through August 31 for other species), including a minimum 820-m (250-ft) buffer zone around any occupied nest, 492 m (150 ft) for other non-special status passerine birds, and up to 1,640 m (500 ft) for raptors.
- Construction-related activities would not be allowed within the buffer zone until the young have fledged.
- For activities that occur outside the bird breeding season (generally September 1 through February 28), such surveys would not be required.

#### **Threatened and Endangered Species**

***Pacific Salmon and Trout: Coho Salmon, Chinook Salmon, and Steelhead:*** *The construction contractor shall adopt BMPs that NOAA Fisheries, USFWS, and CDFG believe would help avoid jeopardizing the continued existence of the species, including:*

- *Loss of vegetation and delivery of sediments to streams will be minimized through the creation of buffer zones where the project crosses through riparian areas. Construction activities, such as staging, stockpiling of materials or equipment, and equipment movement will be limited to locations outside of riparian areas, where possible. Riparian areas will be identified as ESAs and will be clearly marked with fencing.*

- *Construction and grading that would affect Copeland Creek, Laguna de Santa Rosa, Willow Brook and drainages, or upland areas that might erode into the creek or drainages, would be restricted to the period from June 15 to October 15.*
- *A Storm Water Pollution Prevention Plan (SWPPP) will be implemented to minimize storm water and groundwater pollution caused by construction activities. The SWPPP will outline erosion control measures and other BMPs to control and prevent to the maximum extent practicable the discharge of pollutants to surface and water and groundwater.*
- *Laguna de Santa Rosa, Willow Brook and Copeland Creek will be temporarily piped through the construction area between June 15 and October 15.*
- *All coho salmon, Chinook salmon, and steelhead present in dewatered areas will be captured and transported to free flowing water by a NOAA Fisheries approved biologist.*

**California Tiger Salamander.** *Avoidance and minimization efforts would be implemented to avoid construction-related impacts to CTS, as described below.*

- *All required BMPs will be in place during construction.*
- *Construction will be limited to the dry season (June 1 – October 31) in aquatic habitat when drainages and wetlands would be either dry or at their lowest water level to minimize impacts to aquatic resources including the potential for take of breeding/migrating CTS. CTS habitat that can be avoided during construction will be flagged and designated as an Environmentally Sensitive Area. All construction personnel will avoid these areas.*
- *A qualified biologist(s) shall be onsite during all activities that may result in the take of CTS. The biologist shall have oversight over implementation of all the Terms and Conditions of the Biological Opinion, and shall have the authority to stop project activities, through communication with the resident engineer, if any of the requirements associated with these Terms and Conditions are not being fulfilled. The biologist(s) shall be given the authority to stop any work that may result in the take of this listed animal species. If the biologist(s) exercises this authority, USFWS and CDFG shall be notified by telephone and electronic mail within one working day.*
- *Pre-construction surveys for CTS shall be conducted by a USFWS-approved biologist.*
- *The onsite biologist monitor will check for animals under any equipment before the start of work each morning.*
- *Only USFWS-approved biologist(s) familiar with the biology and ecology of CTS shall capture or handle this listed species.*
- *Biologists shall take precautions to prevent introduction of amphibian diseases to the action area by disinfecting equipment and clothing as directed in the October 2003 California tiger salamander protocol titled, Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander.*
- *To prevent inadvertent entrapment of CTS during construction, all excavated, steep-walled holes or trenches more than two feet (0.61 meters) deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist should immediately place escape ramps or other appropriate structures to allow the*

*animal to escape, or USFWS and/or CDFG shall be contacted by telephone for guidance. USFWS shall be notified of the incident by telephone or electronic mail within one working day.*

- *No canine or feline pets shall be permitted in the action area.*
- *No plastic mono-filament netting or similar material shall be used.*
- *An employee education program covering the California tiger salamander must be conducted by the contractor before groundbreaking.*

**California Red-legged Frog.** *To prevent impacts to California red-legged frogs that may enter project drainages, the following actions consistent with construction near surface waters shall be implemented:*

- *Wetland areas that cannot be avoided shall be drained between mid-August and late-September. Construction activities shall occur during October through November after draining the wetland or following a survey by a qualified biologist to confirm that tadpoles are not present. The conduct of construction activities outside this period shall be subject to review and approval by the USFWS.*
- *All fueling and maintenance of vehicles and other equipment shall occur at least 20 m (66 ft) from any riparian habitat or water body. SCTA shall ensure that contamination of habitat does not occur during such operations. Prior to the onset of work, the USFWS shall ensure that SCTA has prepared a spill prevention and action plan to allow a prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.*
- *During construction, native riparian and upland vegetation on the upper banks of wetlands and creeks shall remain in place to provide cover for red-legged frogs except in areas where the equipment would require access to the wetlands and creeks during sediment removal activities. To the extent feasible, sediment removal shall occur in the bottom of the creeks, below the high water mark.*
- *The size of staging areas and the total area of the activity shall be limited to the minimum necessary to achieve the project goal. Routes and boundaries shall be clearly marked.*
- *To control erosion during and after project implementation, the applicant shall implement BMPs as identified by the RWQCB.*

### 3.16.14 Construction Employment

Given the size of the Bay Area economy, neither the No-Build nor the Build alternatives would result in substantial changes to regional socioeconomics beyond current regional planned and forecasted growth. The Build Alternative would result in a temporary increase in construction related employment, as described below.

#### 3.16.14.1 METHODOLOGY AND IMPACTS

Table 3.16.14-1 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the No-Build and Build Alternatives. Estimates are based in part on an input/output study of construction activity in Texas by the Federal Highway Administration (Politano and Roadifer, 1989). Funds created in economic output include the

multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the San Francisco Bay Area region and would also follow the labor and material markets for transportation-related construction.

With respect to job creation, FHWA found nationally in the early 1980s that a \$1 million investment in transportation construction would directly generate 10 on-site, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.4 PYE positions to reflect inflation through 2007. When off-site, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full time PYE positions created rises to about 11.0, adjusting for inflation, for each \$1 million of highway investment.

**Table 3.16.14-1: Impacts from Construction Investment in the Highway 101 HOV Lane Widening Project: Petaluma to Rohnert Park (millions of 2007 dollars)**

Alternative	Construction Value *	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				On-Site	Total
Build Alternative – Option A	\$150.1	\$260.86	\$69.10	800	1,600
Build Alternative – Option B	\$163.8	\$284.67	\$75.41	900	1,800
No-Build Alternative	N/A	N/A	N/A	N/A	N/A

\* Construction impacts are based on preliminary estimates for construction value, which exclude right-of-way costs and include design, construction management, and agency costs.

N/A = Not Applicable

A.L. Politano and Carol J. Roadifer, Regional Economic Impact Model for Highway Systems, *Transportation Research Record* 1229, Transportation Research Board, Washington D.C., 1989. (Model adjusted to reflect inflation.)

Source: Parsons, 2007.

Compared with the No-Build Alternative, *construction value* for construction of the Build Alternative – Option A would be \$150.1 million, exclusive of right-of-way. *Construction Value* for Option B costs would total \$163.8 million. Construction expenditures would generate approximately 800 to 900 on-site full-time construction positions (PYE) and 1,600 to 1,800 total positions (PYE), including direct, indirect, and induced, as compared to the No-Build Alternative.

The impact of this direct and indirect employment added to the regional economy would be positive.

### 3.16.14.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

As the impacts are beneficial, no mitigation is proposed.